

## **Burlington Design Advisory Board**

149 Church Street, City Hall

Burlington, VT 05401

[www.burlingtonvt.gov/PZ/DAB](http://www.burlingtonvt.gov/PZ/DAB)

Phone: (802) 865-7188

Fax: (802) 865-7195

*Matthew Bushey  
Ron Wanamaker  
Sean McKenzie  
Steven Offenhartz  
Chris Alley  
Philip Hammerslough, Alt.  
Jeremy Gates, Alt.*



**DESIGN ADVISORY BOARD  
Special Meeting  
Tuesday January 17, 2017 at 3:00 PM  
Conference Room 12, City Hall, Burlington, VT  
Agenda**

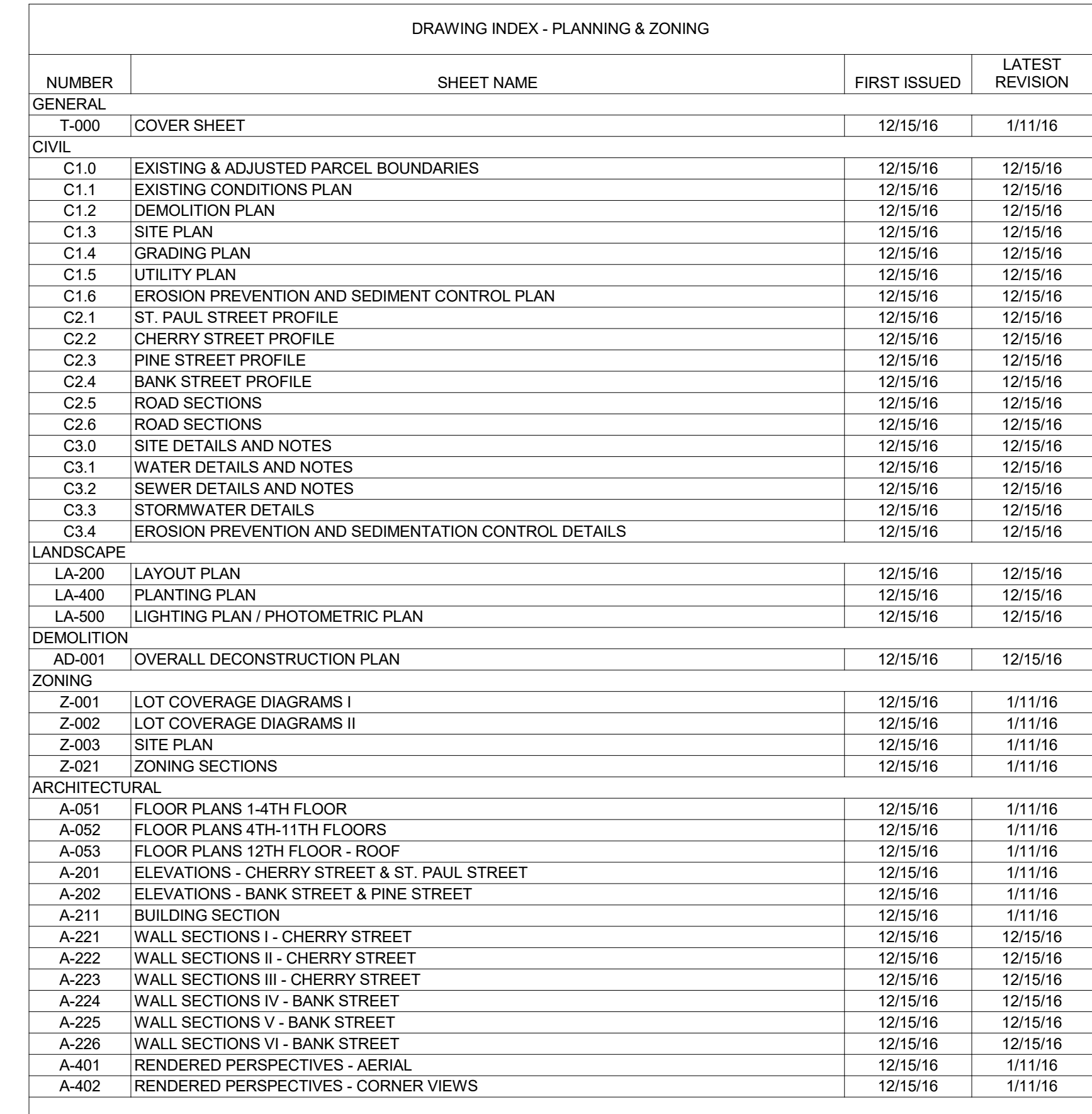
**Session I - 3:00pm – 5:00pm**

- 1. 17-0662CA/MA; 75 CHERRY STREET (D, Ward 3C) PKSB Architects, PC / Devonwood Investors, LLC**  
950,000 sf mixed use redevelopment of the existing Burlington Town Center mall site and associated lot line adjustments.  
(Project Managers, Mary O'Neil, Scott Gustin.)

*The programs and services of the City of Burlington are accessible to people with disabilities. Individuals who require special arrangements to participate are encouraged to contact the Department of Planning & Zoning at least 72 hours in advance so that proper accommodations can be arranged. For information call 865-7188 (TTY users: 865-7142).*



## PLANNING & ZONING SUBMISSION



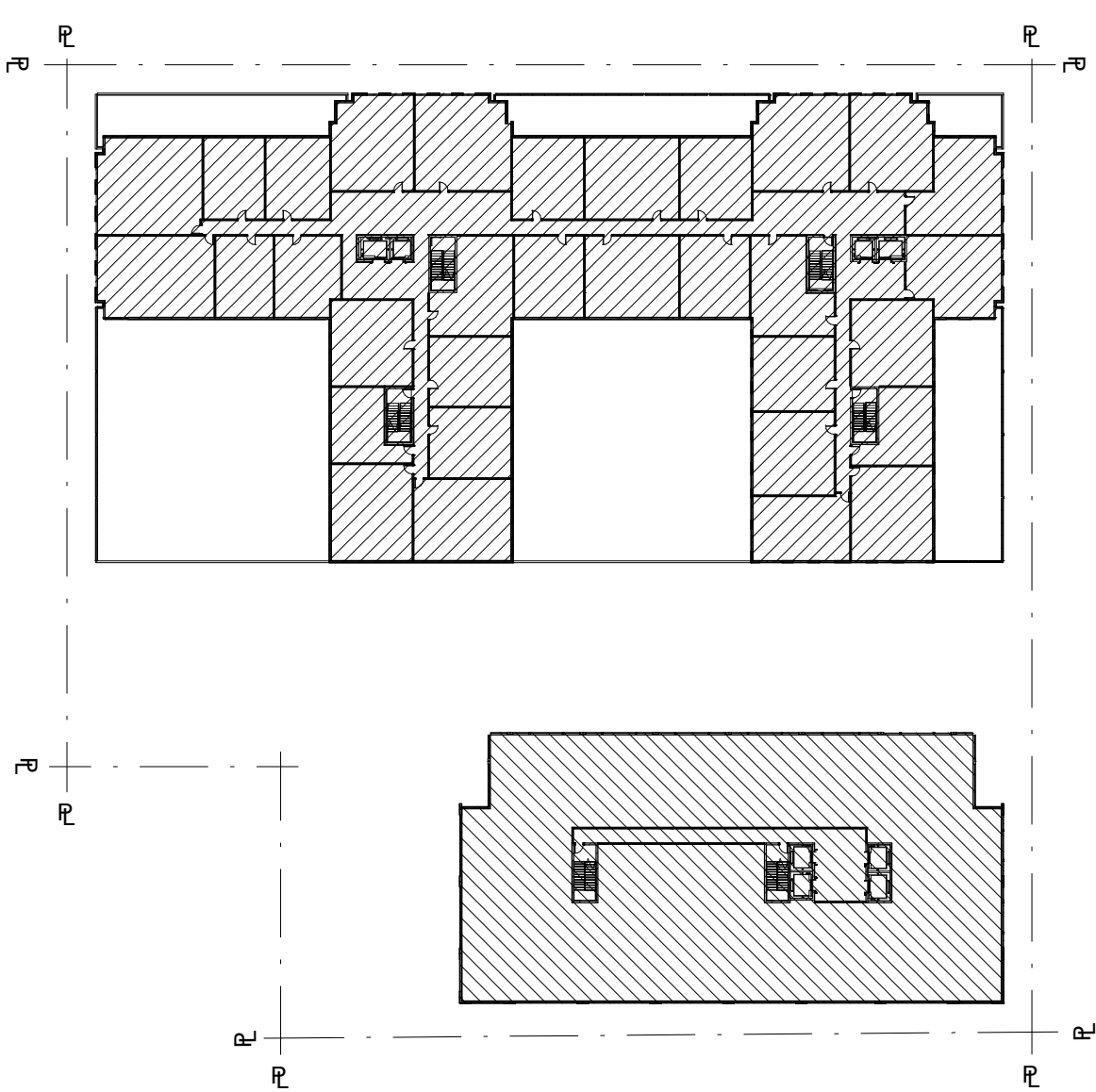
|                              |                                                      |
|------------------------------|------------------------------------------------------|
| <b>SE Group</b>              | <b>Landscape Architect</b>                           |
| 131 Church Street, 3rd Floor | (802)-862-0098                                       |
| Burlington, VT 05401         | <a href="http://www.segroup.com">www.segroup.com</a> |

| DRAWING INDEX - PLANNING & ZONING |                                                      |              |                 |
|-----------------------------------|------------------------------------------------------|--------------|-----------------|
| NUMBER                            | SHEET NAME                                           | FIRST ISSUED | LATEST REVISION |
| GENERAL                           |                                                      |              |                 |
| T-000                             | COVER SHEET                                          | 12/15/16     | 1/11/16         |
| CIVIL                             |                                                      |              |                 |
| C1.0                              | EXISTING & ADJUSTED PARCEL BOUNDARIES                | 12/15/16     | 12/15/16        |
| C1.1                              | EXISTING CONDITIONS PLAN                             | 12/15/16     | 12/15/16        |
| C1.2                              | DEMOLITION PLAN                                      | 12/15/16     | 12/15/16        |
| C1.3                              | SITE PLAN                                            | 12/15/16     | 12/15/16        |
| C1.4                              | GRADING PLAN                                         | 12/15/16     | 12/15/16        |
| C1.5                              | UTILITY PLAN                                         | 12/15/16     | 12/15/16        |
| C1.6                              | EROSION PREVENTION AND SEDIMENT CONTROL PLAN         | 12/15/16     | 12/15/16        |
| C2.1                              | ST. PAUL STREET PROFILE                              | 12/15/16     | 12/15/16        |
| C2.2                              | CHERRY STREET PROFILE                                | 12/15/16     | 12/15/16        |
| C2.3                              | PINE STREET PROFILE                                  | 12/15/16     | 12/15/16        |
| C2.4                              | BANK STREET PROFILE                                  | 12/15/16     | 12/15/16        |
| C2.5                              | ROAD SECTIONS                                        | 12/15/16     | 12/15/16        |
| C2.6                              | ROAD SECTIONS                                        | 12/15/16     | 12/15/16        |
| C3.0                              | SITE DETAILS AND NOTES                               | 12/15/16     | 12/15/16        |
| C3.1                              | WATER DETAILS AND NOTES                              | 12/15/16     | 12/15/16        |
| C3.2                              | SEWER DETAILS AND NOTES                              | 12/15/16     | 12/15/16        |
| C3.3                              | STORMWATER DETAILS                                   | 12/15/16     | 12/15/16        |
| C3.4                              | EROSION PREVENTION AND SEDIMENTATION CONTROL DETAILS | 12/15/16     | 12/15/16        |
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| LA-400                            | PLANTING PLAN                                        | 12/15/16     | 12/15/16        |
| LA-500                            | LIGHTING PLAN / PHOTOMETRIC PLAN                     | 12/15/16     | 12/15/16        |
| DEMOLITION                        |                                                      |              |                 |
| AD-001                            | OVERALL DECONSTRUCTION PLAN                          | 12/15/16     | 12/15/16        |
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| Z-002                             | LOT COVERAGE DIAGRAMS II                             | 12/15/16     | 1/11/16         |
| Z-003                             | SITE PLAN                                            | 12/15/16     | 1/11/16         |
| Z-021                             | ZONING SECTIONS                                      | 12/15/16     | 1/11/16         |
| ARCHITECTURAL                     |                                                      |              |                 |
| A-051                             | FLOOR PLANS 1-4TH FLOOR                              | 12/15/16     | 1/11/16         |
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| A-053                             | FLOOR PLANS 12TH FLOOR - ROOF                        | 12/15/16     | 1/11/16         |
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| A-202                             | ELEVATIONS - BANK STREET & PINE STREET               | 12/15/16     | 1/11/16         |
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| A-225                             | WALL SECTIONS V - BANK STREET                        | 12/15/16     | 12/15/16        |
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| A-402                             | RENDERED PERSPECTIVES - CORNER VIEWS                 | 12/15/16     | 1/11/16         |

1 of 35

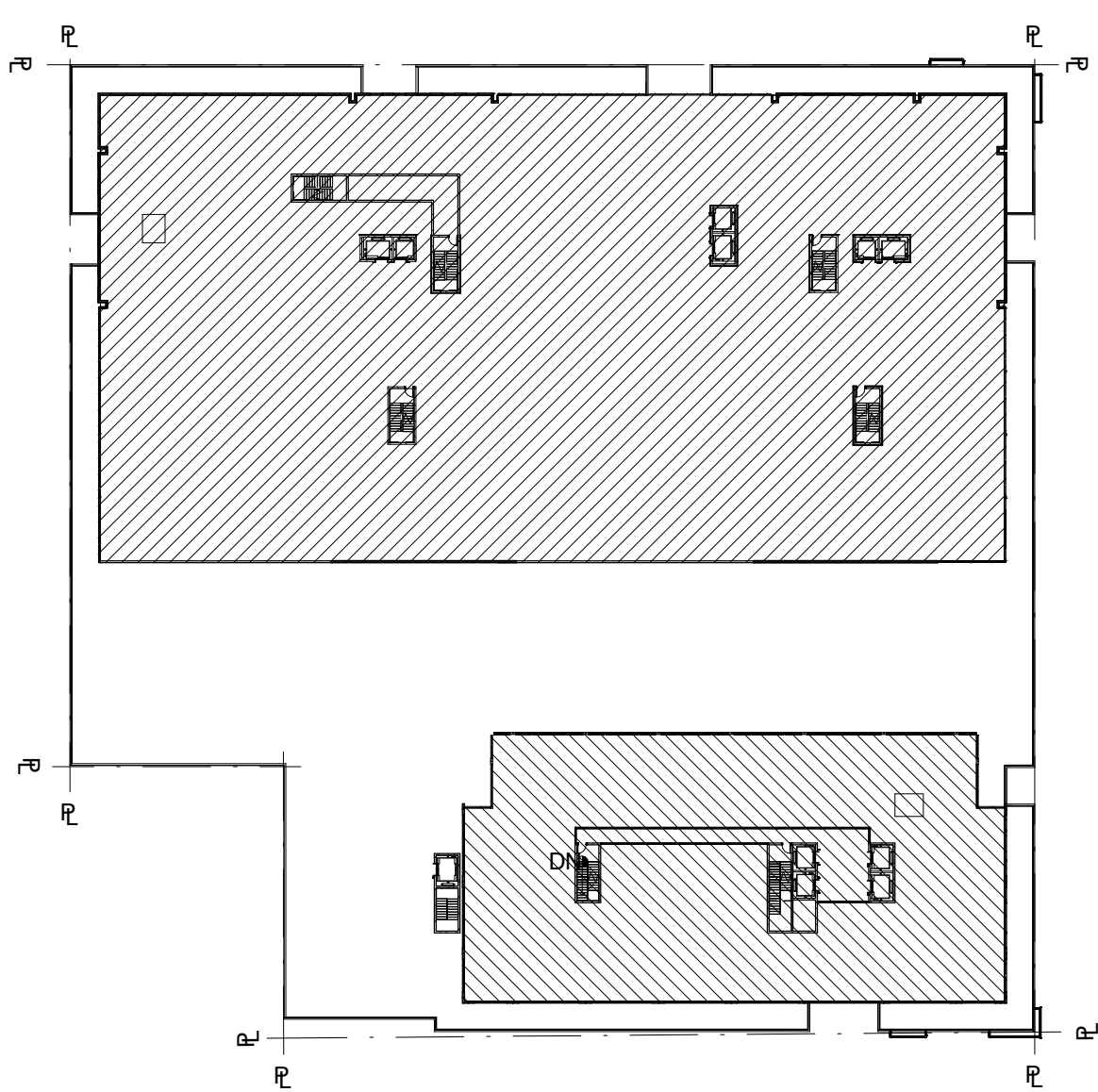


| 8TH FLOOR NORTH & 9TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 8TH   | 33,788.72 SF | 30.78 %  |
| SOUTH                                      | 9TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 51,657.30 SF | 47.06 %  |



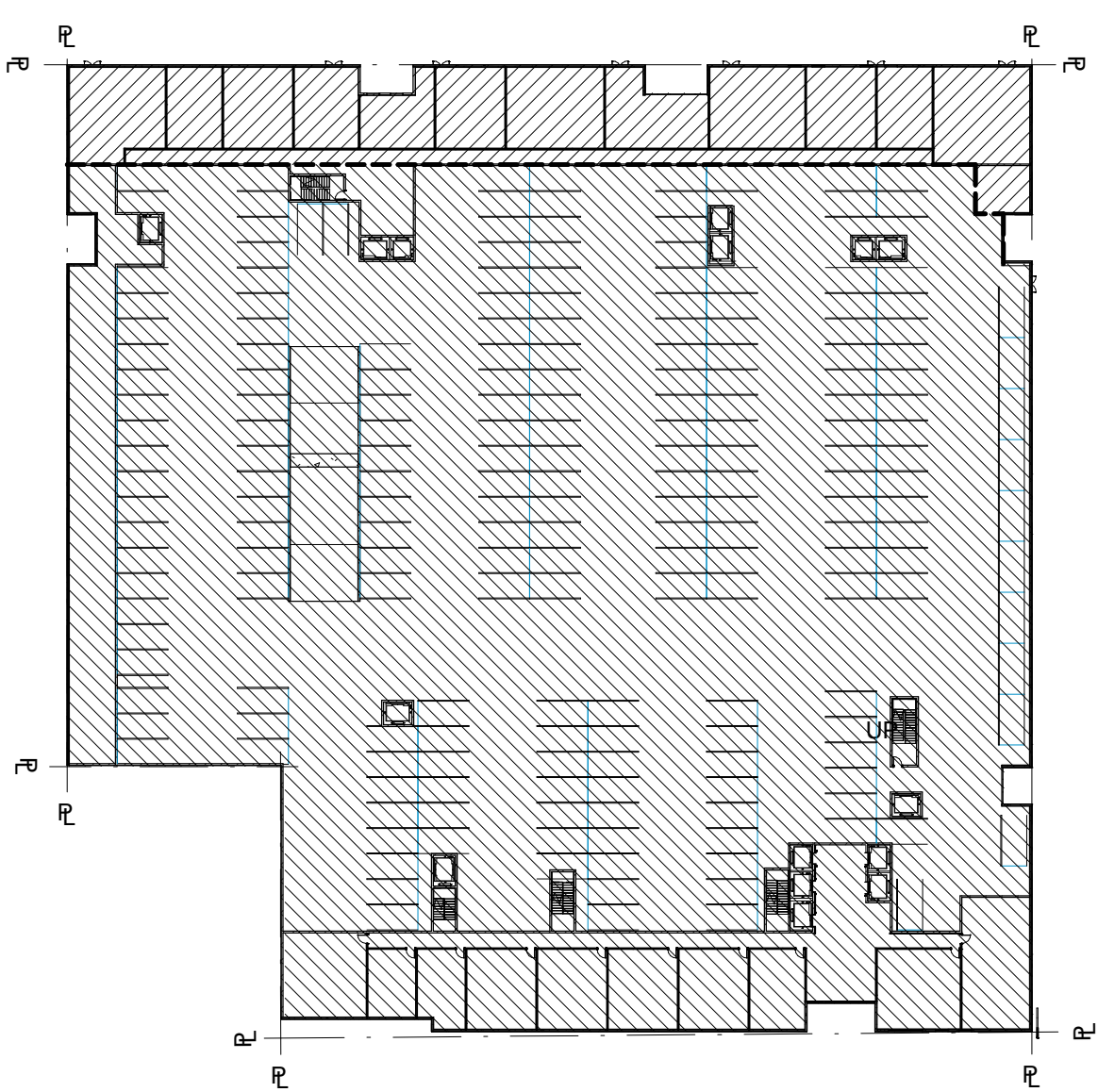
9 LOT COVERAGE - 8TH FLOOR NT  
& 9TH FLOOR ST  
1/64" = 1'-0"

| 5TH FLOOR NORTH & 6TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 5TH   | 53,281.74 SF | 48.54 %  |
| SOUTH                                      | 6TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 71,150.32 SF | 64.82 %  |



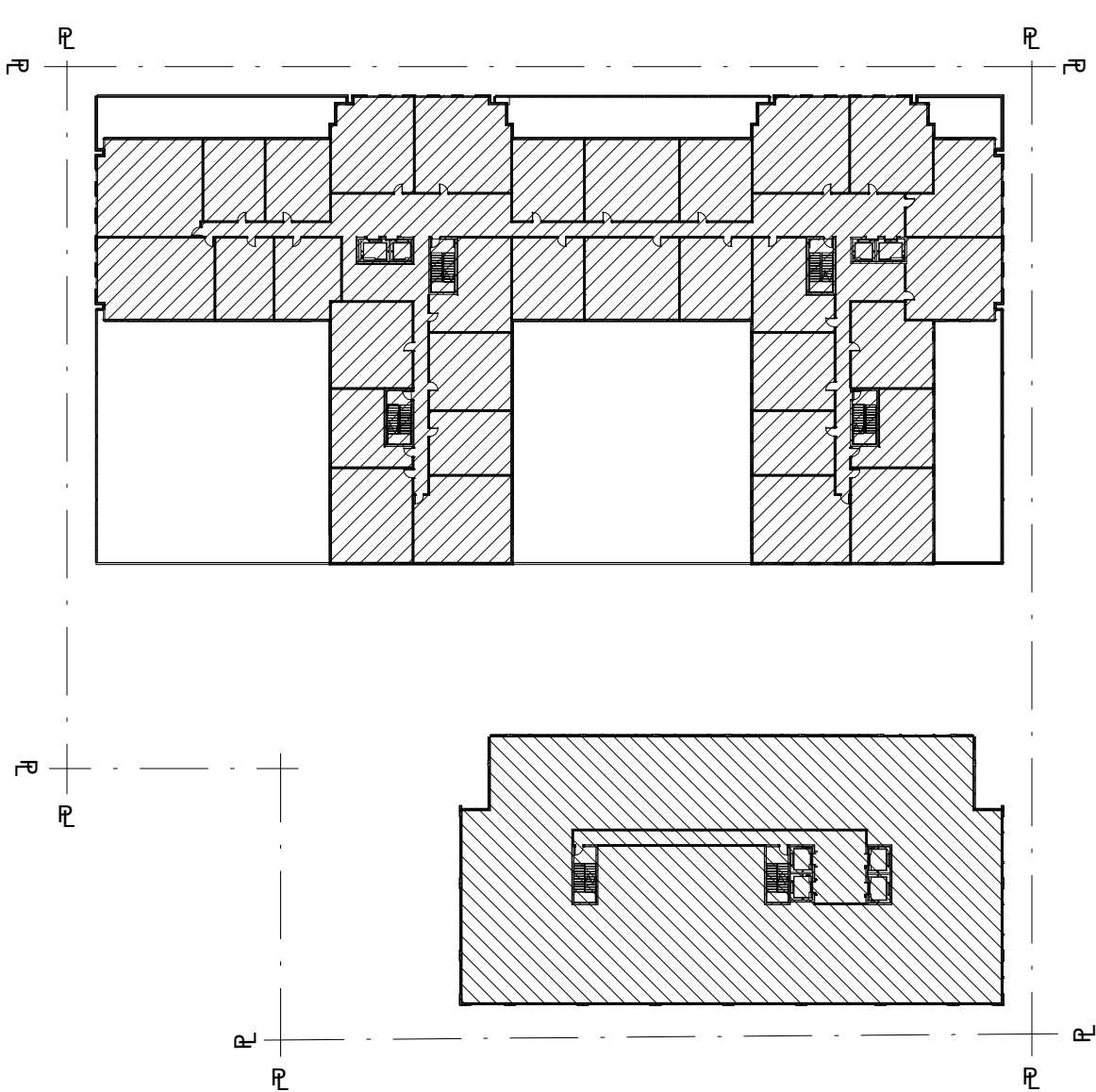
6 LOT COVERAGE - 5TH FLOOR NT  
& 6TH FLOOR ST  
1/64" = 1'-0"

| 2ND FLOOR NORTH & 3RD FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 2ND   | 11,987.02 SF  | 10.92 %  |
| SOUTH                                      | 3RD   | 95,942.43 SF  | 87.40 %  |
| TOTAL                                      |       | 107,929.45 SF | 98.32 %  |



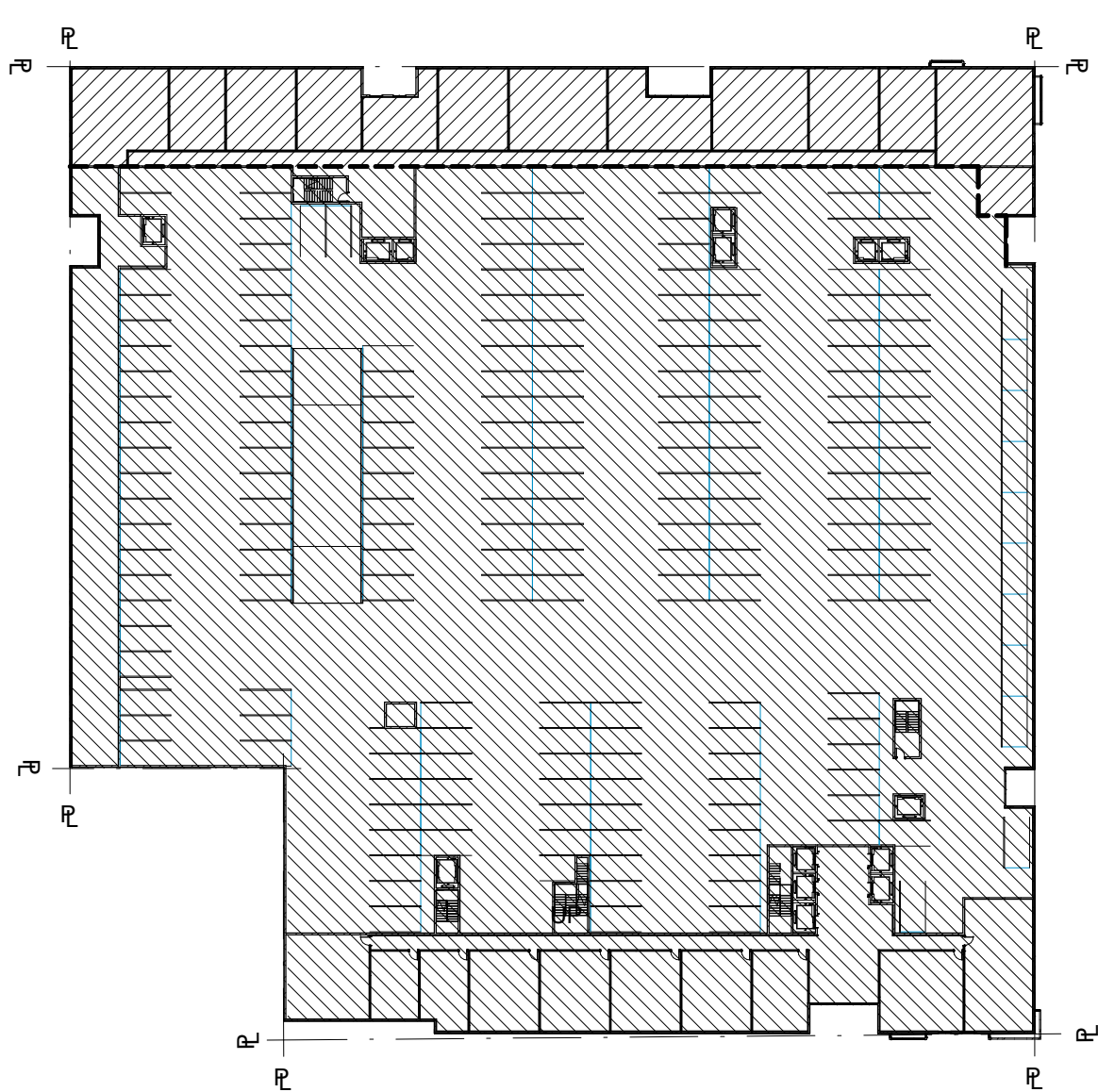
3 LOT COVERAGE - 2ND FLOOR NT  
& 3RD FLOOR ST  
1/64" = 1'-0"

| 7TH FLOOR NORTH & 8TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 7TH   | 33,788.72 SF | 30.78 %  |
| SOUTH                                      | 8TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 51,657.30 SF | 47.06 %  |



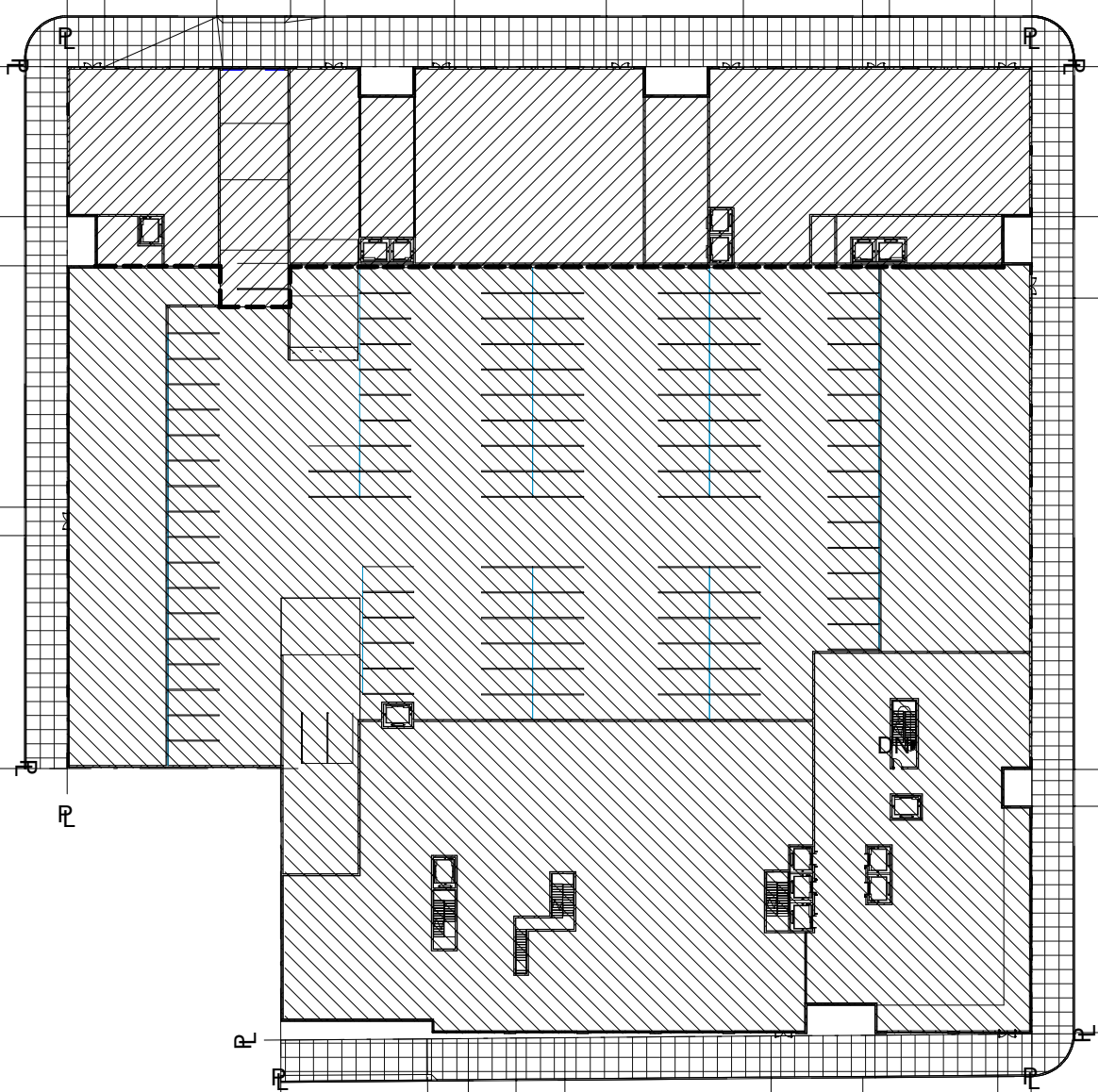
8 LOT COVERAGE - 7TH FLOOR NT  
& 8TH FLOOR ST  
1/64" = 1'-0"

| 4TH FLOOR NORTH & 5TH FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 4TH   | 11,987.02 SF  | 10.92 %  |
| SOUTH                                      | 5TH   | 95,942.43 SF  | 87.40 %  |
| TOTAL                                      |       | 108,116.12 SF | 98.32 %  |



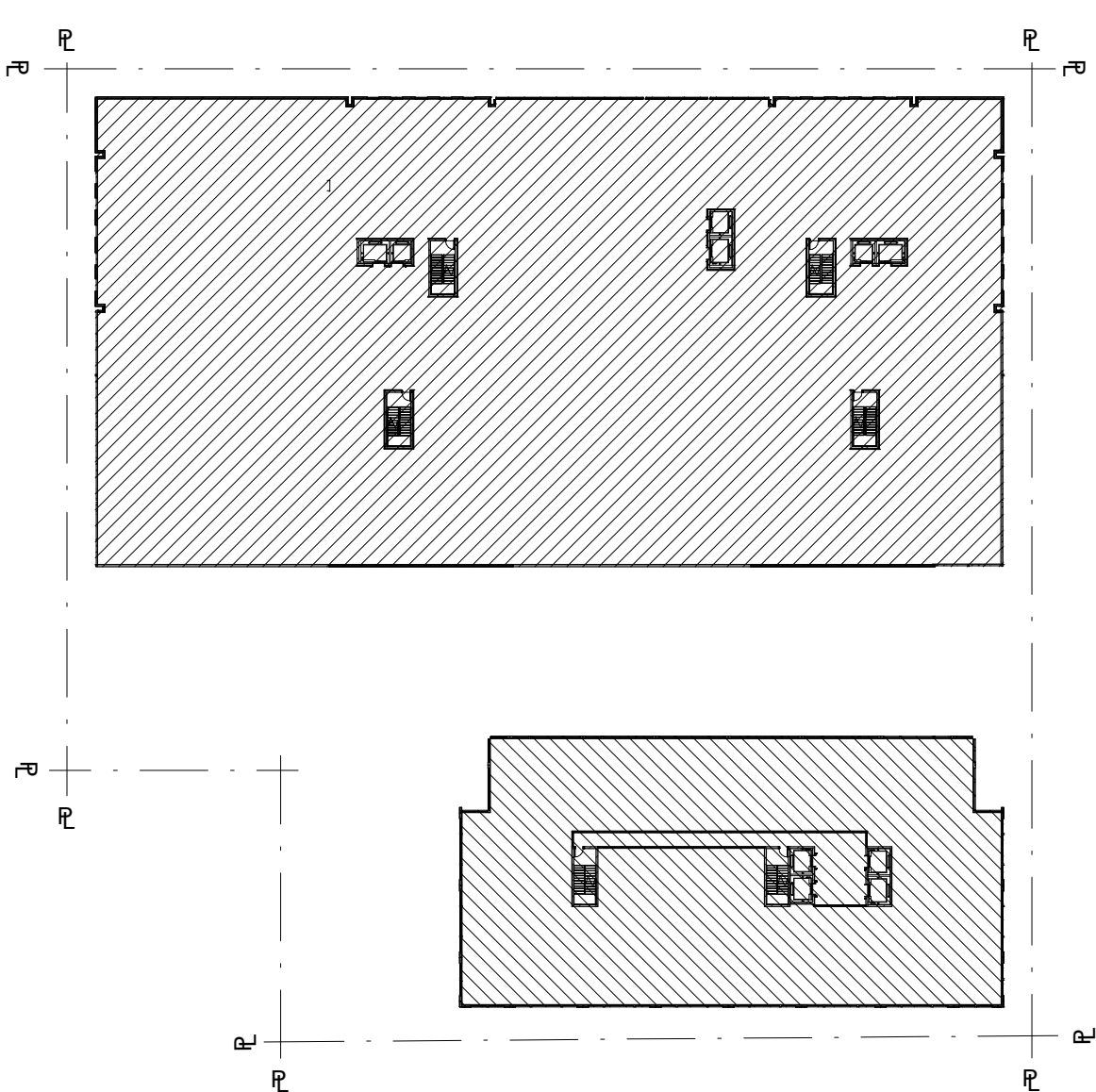
5 LOT COVERAGE - 4TH FLOOR NT  
& 5TH FLOOR ST  
1/64" = 1'-0"

| 1ST FLOOR NORTH & 2ND FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 1ST   | 23,682.33 SF  | 21.57 %  |
| SOUTH                                      | 2ND   | 84,233.53 SF  | 76.73 %  |
| TOTAL                                      |       | 107,915.86 SF | 98.30 %  |



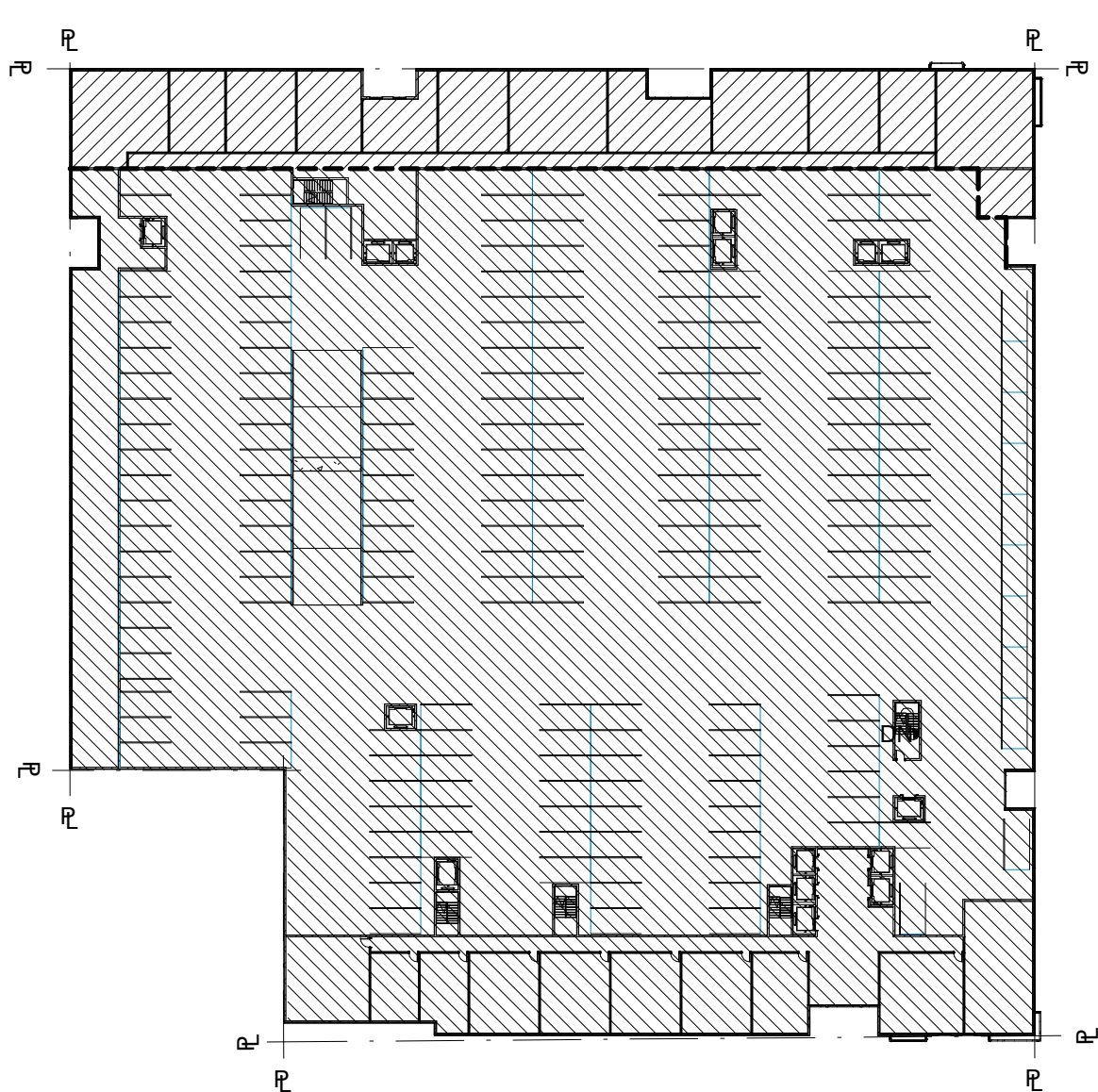
2 LOT COVERAGE - 1ST FLOOR NT  
& 2ND FLOOR ST  
1/64" = 1'-0"

| 6TH FLOOR NORTH & 7TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 6TH   | 53,281.74 SF | 48.54 %  |
| SOUTH                                      | 7TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 71,150.32 SF | 64.82 %  |



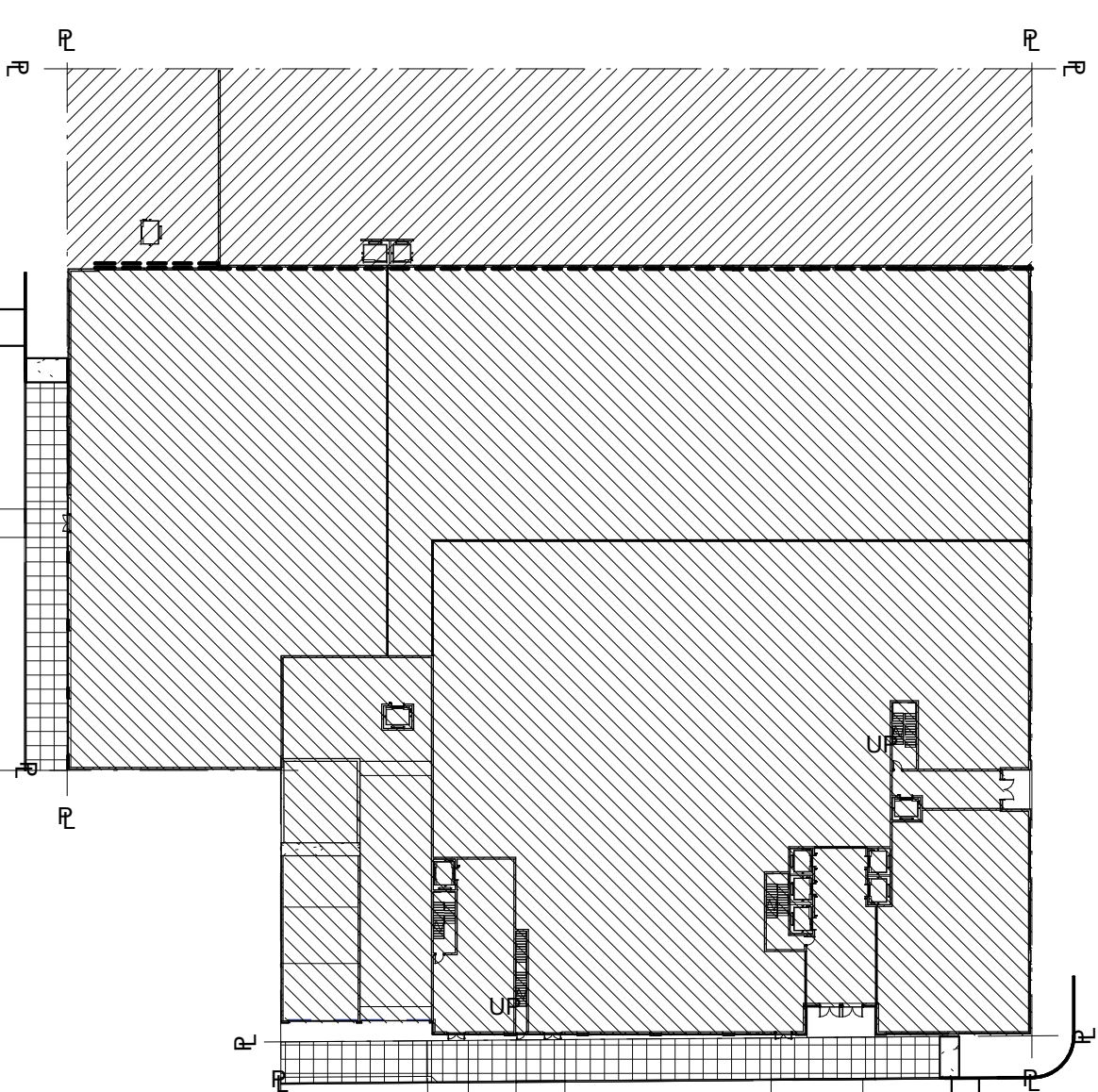
7 LOT COVERAGE - 6TH FLOOR NT  
& 7TH FLOOR ST  
1/64" = 1'-0"

| 3RD FLOOR NORTH & 4TH FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 3RD   | 11,987.02 SF  | 10.92 %  |
| SOUTH                                      | 4TH   | 95,942.43 SF  | 87.40 %  |
| TOTAL                                      |       | 107,929.45 SF | 98.32 %  |



4 LOT COVERAGE - 3RD FLOOR NT  
& 4TH FLOOR ST  
1/64" = 1'-0"

| 1ST FLOOR SOUTH COVERAGE |        |              |          |
|--------------------------|--------|--------------|----------|
| PORTION                  | FLOOR  | AREA         | COVERAGE |
| NORTH                    | CELLAR | 24,026.29 SF | 00.00 %  |
| SOUTH                    | 1ST    | 84,582.32 SF | 77.05 %  |
| TOTAL                    |        | 84,582.32 SF | 77.05 %  |



1 LOT COVERAGE - 1ST FLOOR ST  
1/64" = 1'-0"

NOT FOR CONSTRUCTION

Approval

Project

12/15/16 P&Z Submission

1/11/16 P&Z Resubmission I

Date No. Description

Project

101 Cherry Street

Burlington, VT 05401

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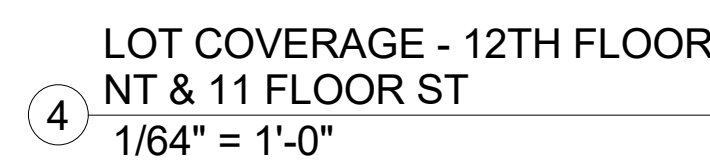
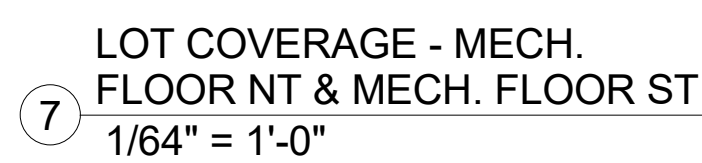
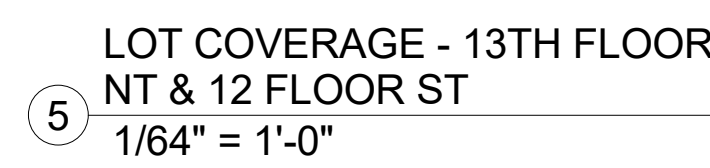
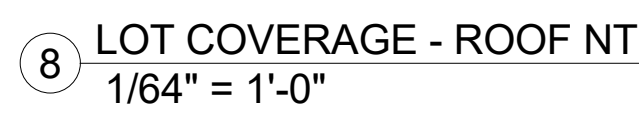
Burlington, VT 05401

101 Cherry Street

Burlington, VT 05401

Z-001

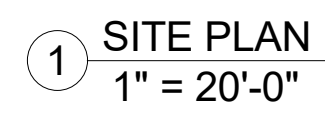


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|                 |                  |
|-----------------|------------------|
| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
| Checked By:     |                  |
| Checker         |                  |
| Scale:          |                  |
| 1/64" = 1'-0"   |                  |

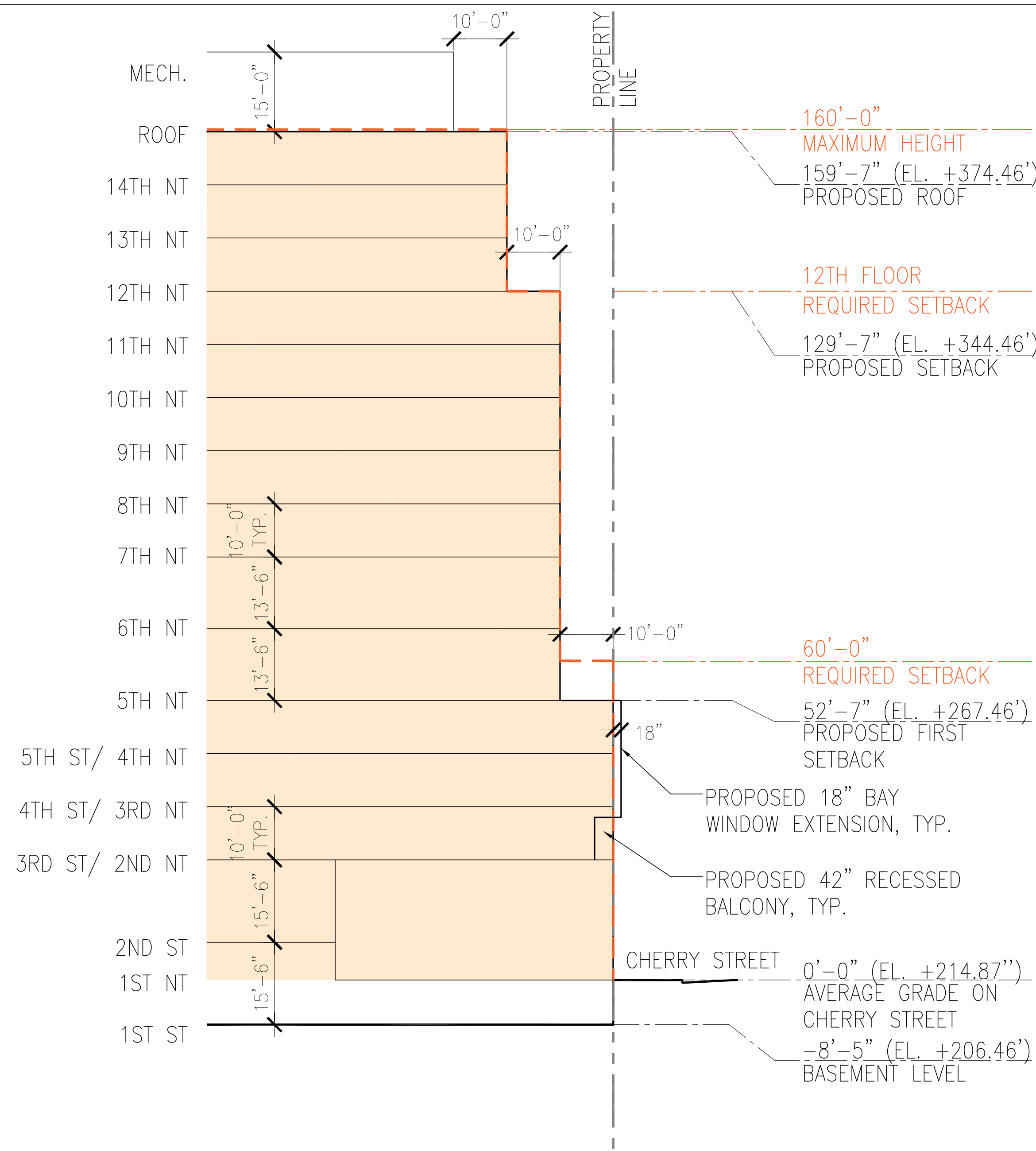
|                                  |                          |
|----------------------------------|--------------------------|
| New Building Application Number: | Drawing:<br><br>25 of 35 |
|----------------------------------|--------------------------|



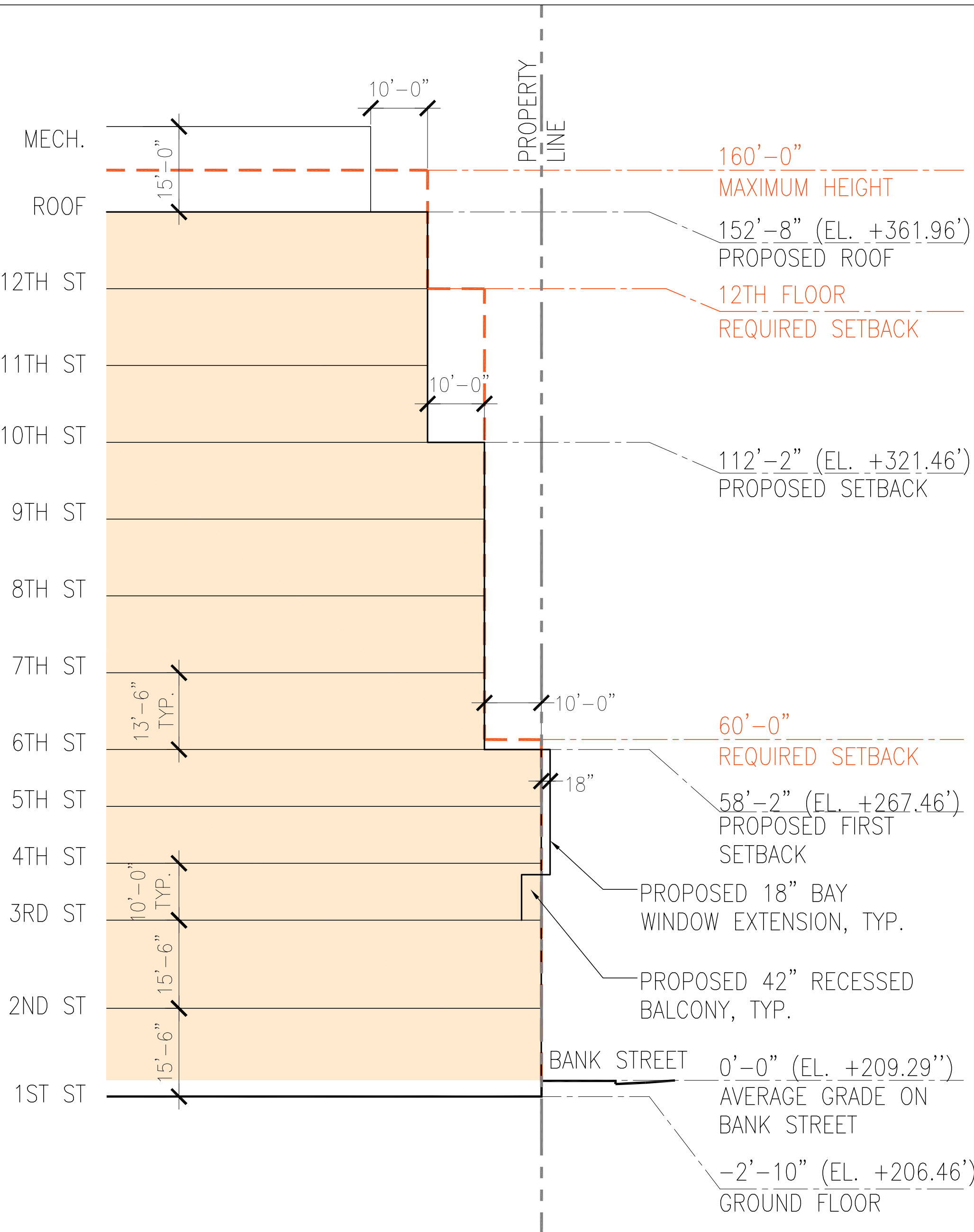


Z-003

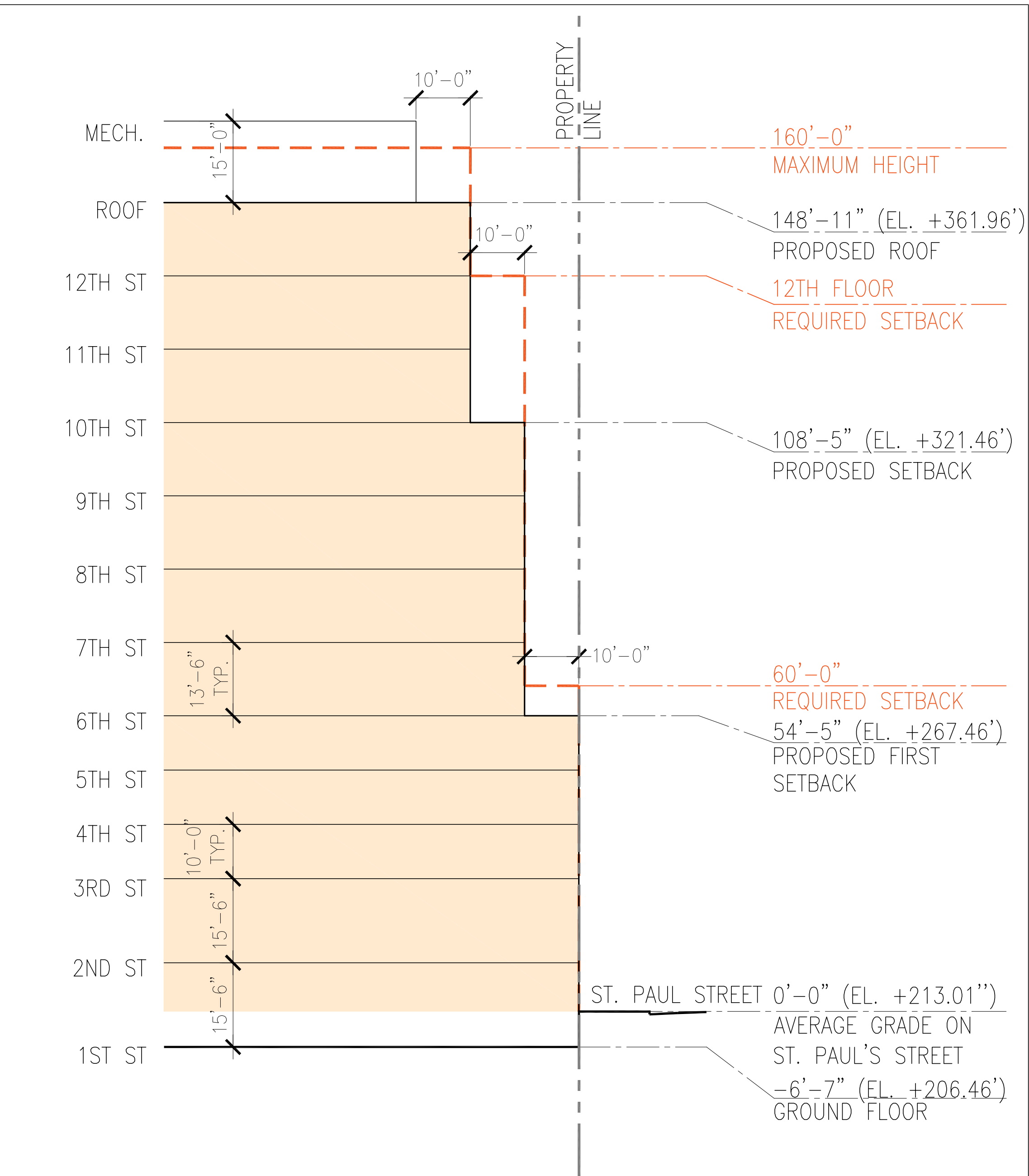




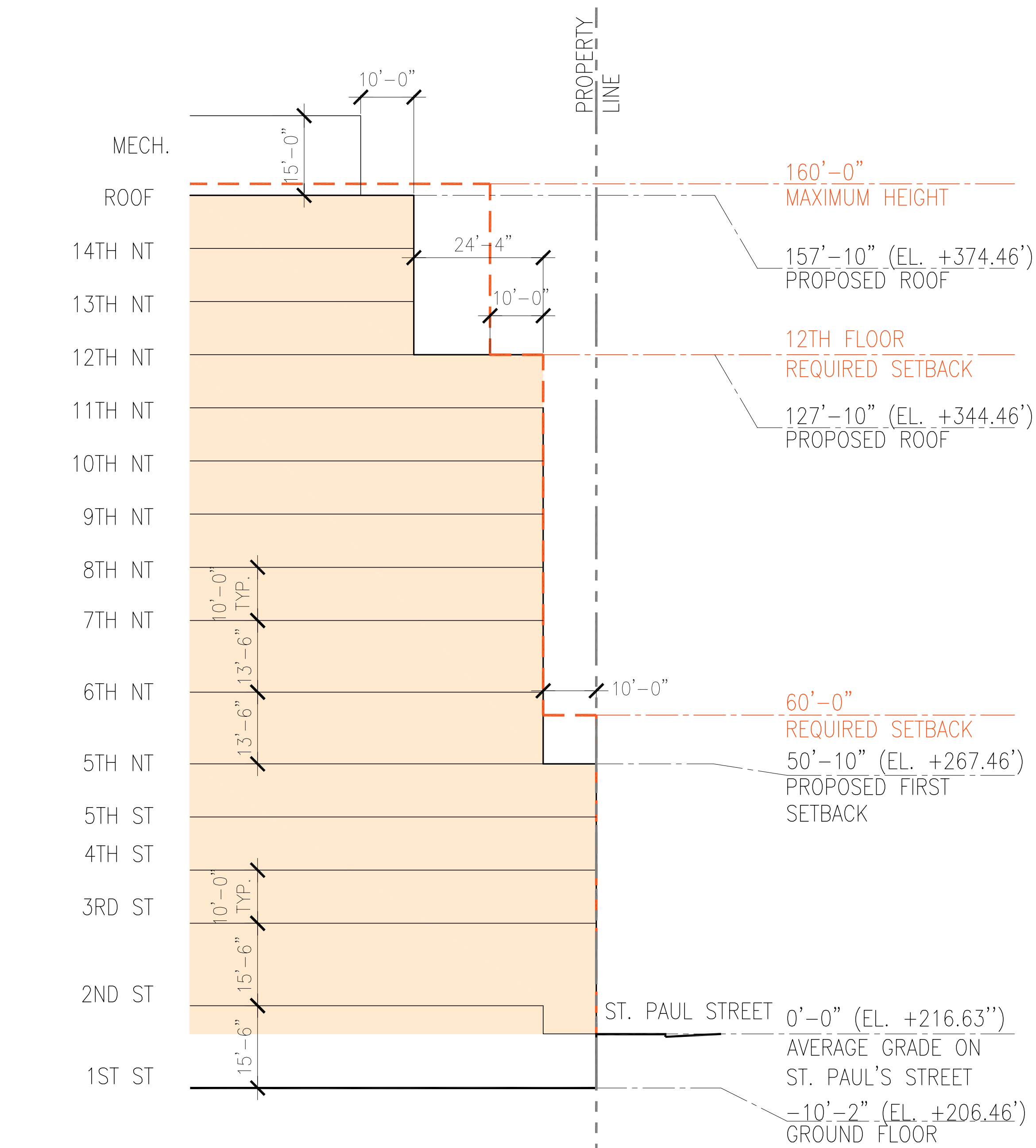
**01** PROPOSED NORTH TOWER BUILDING SETBACK - CHERRY STREET  
1/16" = 1'-0"



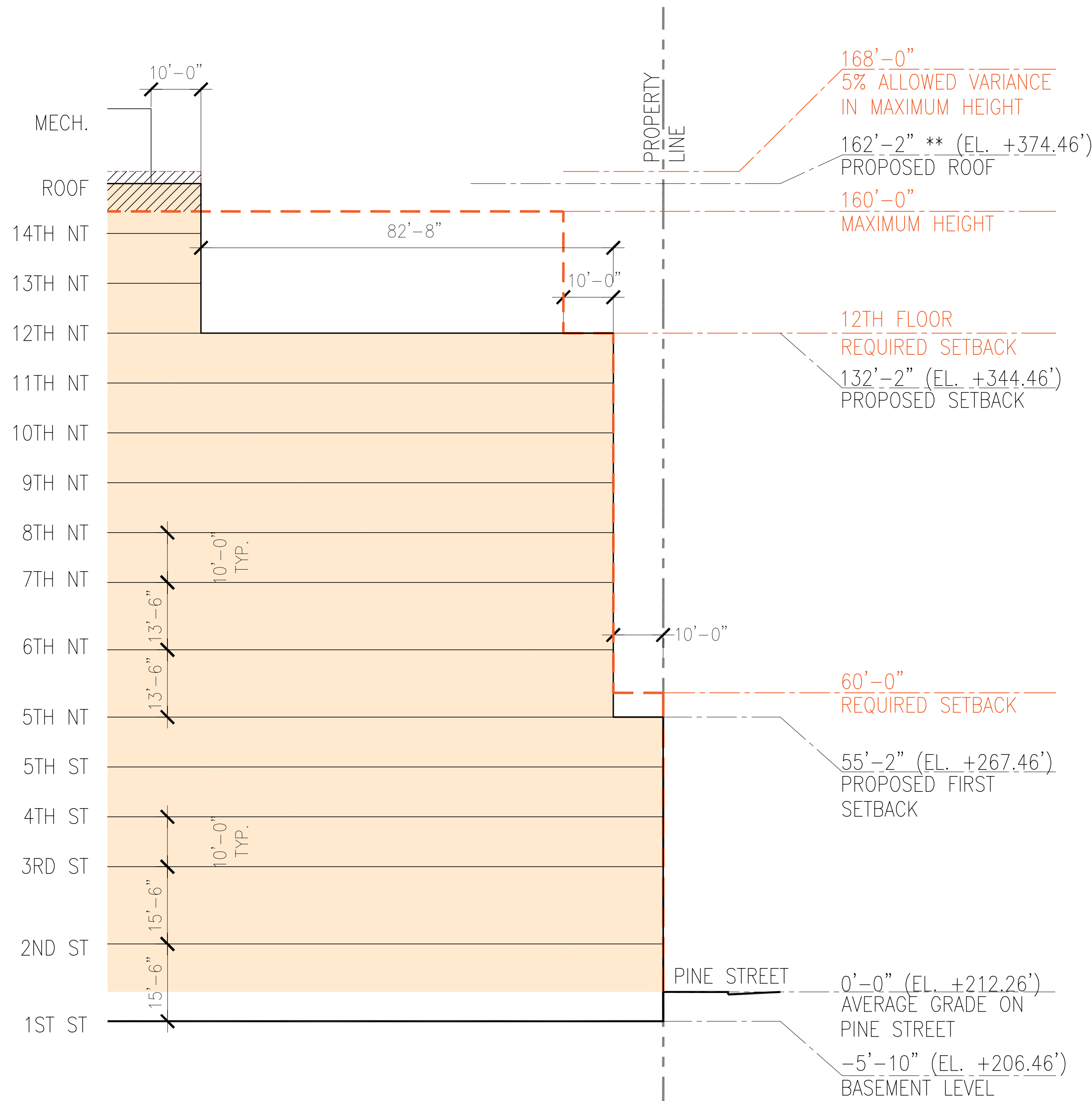
**02** PROPOSED SOUTH TOWER BUILDING SETBACK - BANK STREET  
1/16" = 1'-0"



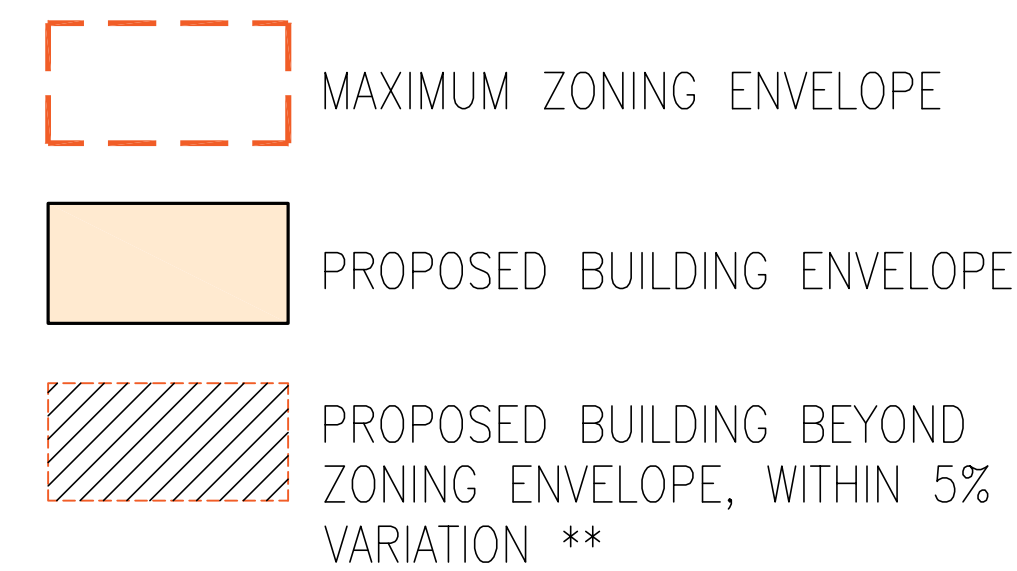
**03** PROPOSED SOUTH TOWER BUILDING SETBACK - ST PAUL ST SOUTH  
1/16" = 1'-0"



**04** PROPOSED NORTH TOWER BUILDING SETBACK - ST PAUL ST NORTH  
1/16" = 1'-0"



**05** PROPOSED NORTH TOWER BUILDING SETBACK - PINE STREET  
1/16" = 1'-0"



**\*\*** 5% HEIGHT VARIATION IN THE MAXIMUM BUILDING HEIGHT IS ALLOWED FOR GRADE CHANGES ACROSS THE SITE. THE ADDITIONAL HEIGHT DOES NOT ENABLE THE CREATION OF AN ADDITIONAL STORY BEYOND THE MAXIMUM PERMITTED. 5'-7" HEIGHT INCREASE @ PINE STREET NORTH TOWER = 3.48% OF 160'-0"

NOT FOR CONSTRUCTION

|            |     |                      |
|------------|-----|----------------------|
| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |
| Date       | No. | Description          |

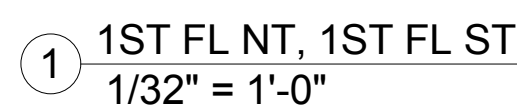
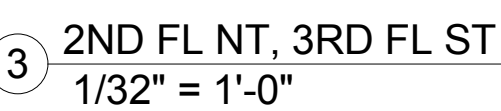
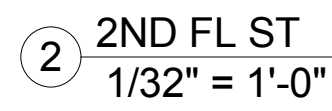
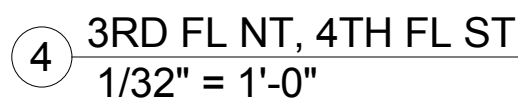
**Burlington Town Center,**  
**Devonwood Investors, LL**  
101 Cherry Street  
Burlington, VT 05401

**BUILDING SECTIONS**

|                |          |                 |
|----------------|----------|-----------------|
| Project Number | 1317-01  | Revision & Date |
| Drawn By       |          |                 |
| Checked By     |          |                 |
| Scale          | AS NOTED |                 |
| Drawing Number |          |                 |

**Z-021**

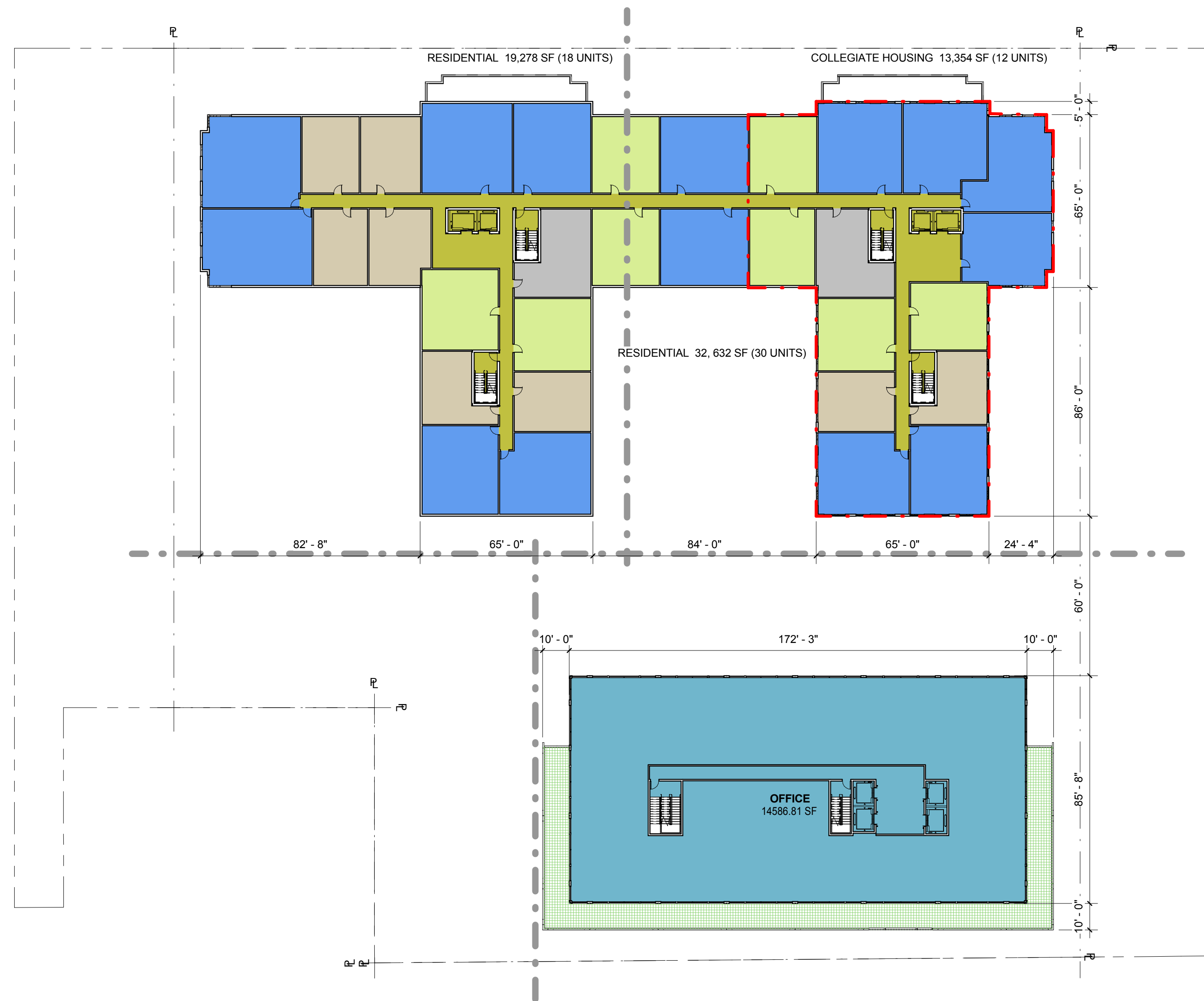


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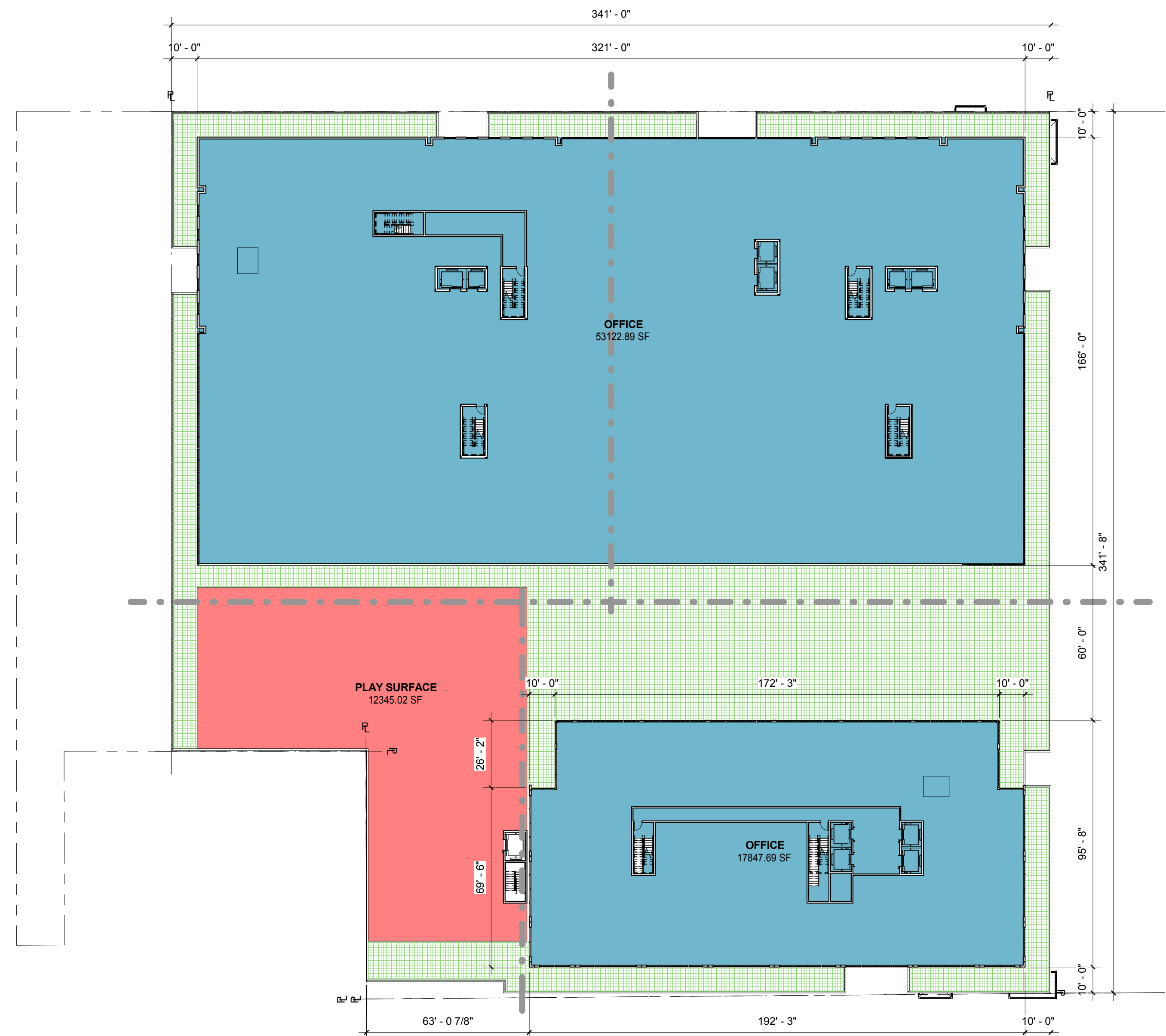
101 Cherry Street  
Burlington, VT 05401

|                                |                  |
|--------------------------------|------------------|
| Project Number:<br><br>1317-01 | Signature & Seal |
| Drawing By:<br><br>Designer    |                  |
| Checked By:<br><br>Checker     |                  |
| Scale:<br><br>As indicated     |                  |
| Drawing Number:                |                  |

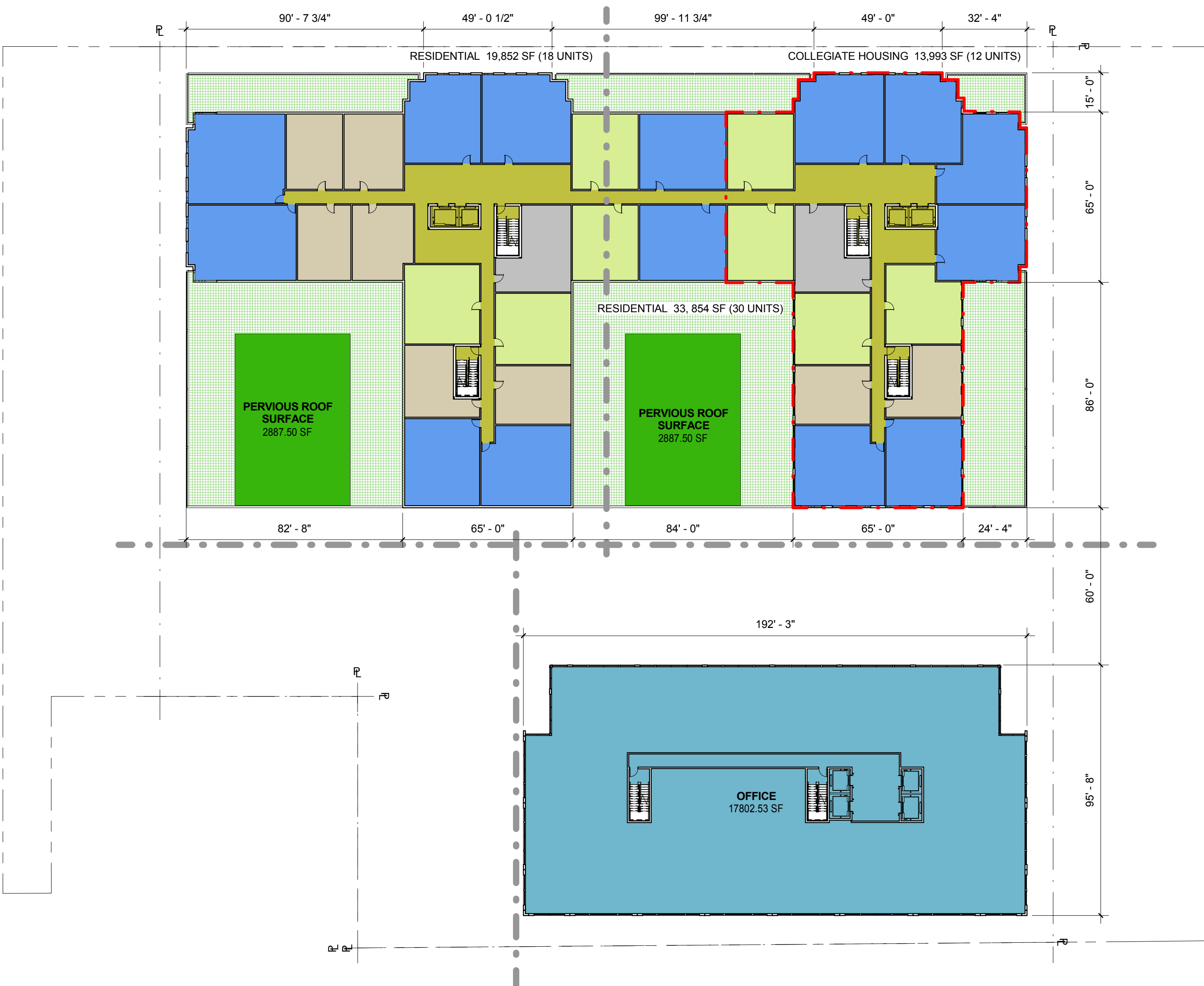




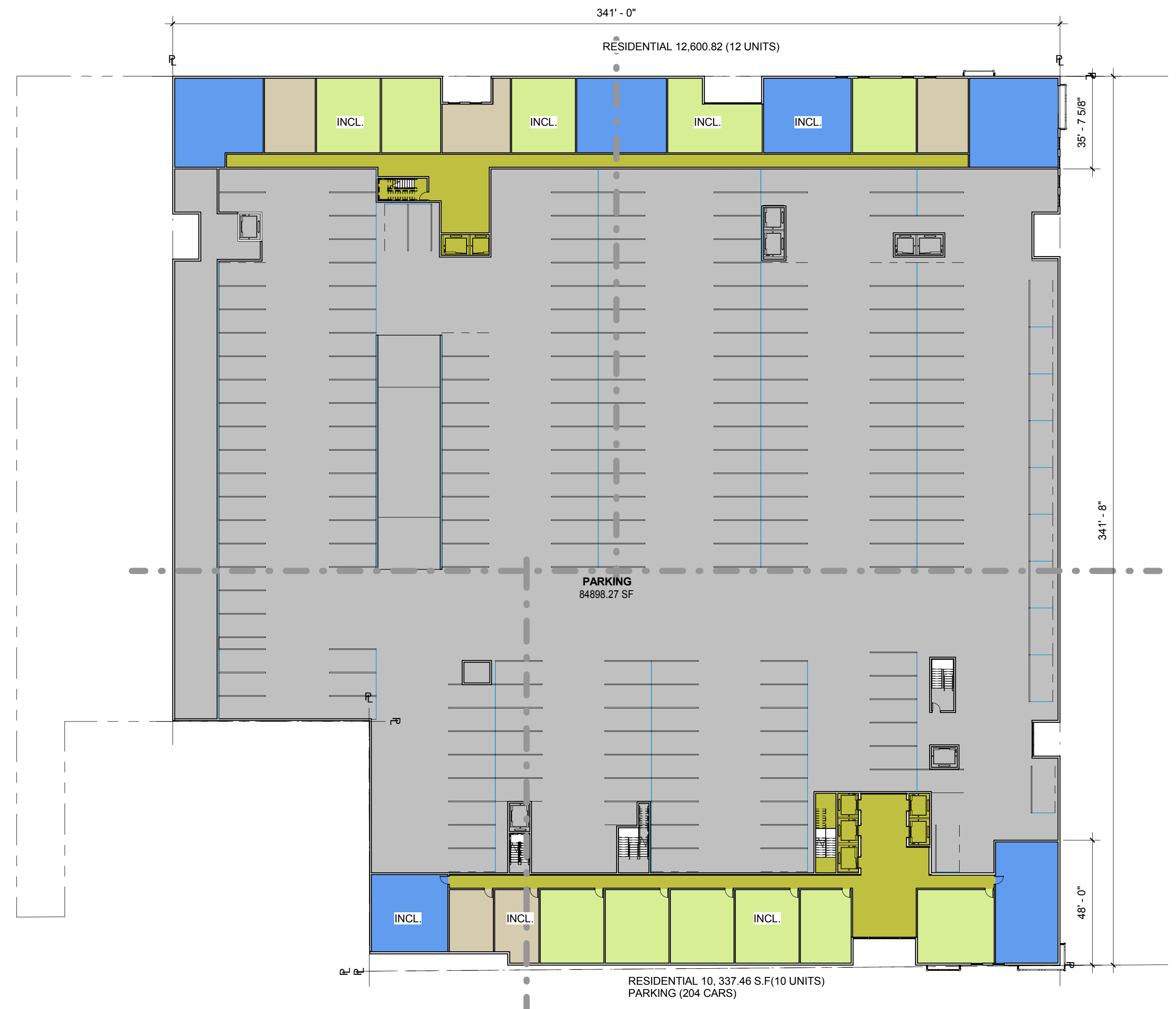
4 11TH FL NT, 10-11TH FLS ST  
1/32" = 1'-0"



2 5-6TH FL NT, 6-7TH FL ST  
1/32" = 1'-0"



3 7-10TH FLS NT, 8-9TH FLS ST  
1/32" = 1'-0"



1 4TH FL NT, 5TH FL ST  
1/32" = 1'-0"

NOT FOR CONSTRUCTION

Approval

Project

12/15/16 P&Z Submission

1/11/16 P&Z Resubmission I

Date No. Description

Project

Burlington Town Center

Devonwood Investors, LLC

101 Cherry Street

Burlington, VT 05401

Drawing Title

FLOOR PLANS

4TH-11TH FLOORS

Project Number

1317-01

Drawn By

Designer

Checked By

Checker

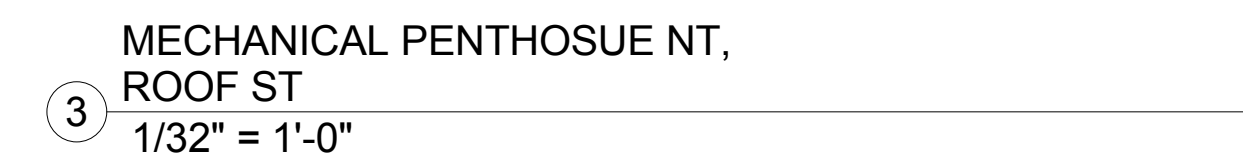
Scale

As indicated

Drawing Number

A-052

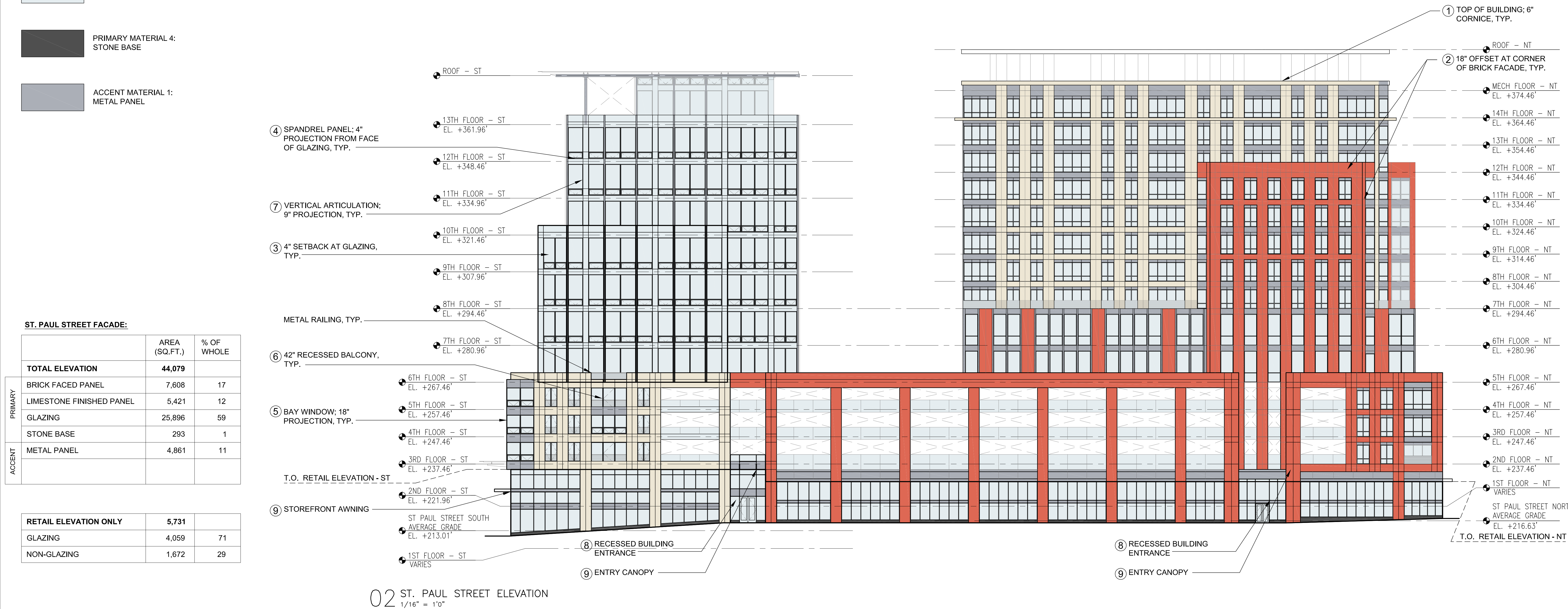


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|                                |                  |
|--------------------------------|------------------|
| Project Number:<br><br>1317-01 | Signature & Seal |
| Drawn By:<br><br>Designer      |                  |
| Checked By:<br><br>Checker     |                  |
| Scale:<br><br>As indicated     |                  |

A-053





**P + S** **K + B** PKSB ARCHITECTS, PC  
330 WEST 42 STREET  
NEW YORK, NY 10036  
212 594 2010  
www.pksb.com

**PC Construction**  
153 Tiller Drive  
South Burlington, VT 05403

**Freeman French Freeman, Inc.**  
81 Maple Street  
Burlington, VT 05401

**Hardy Structural Engineering**  
975 Roosevelt Hwy, Suite 130  
Colchester, VT 05446

**Hallam ICS**  
38 Eastwood Drive, Suite 200  
South Burlington, VT 05403

**Engineering Ventures P.C.**  
208 Flynn Avenue, Suite 2A  
Burlington, VT 05401

**GeoDesign**  
1233 Shelburne Rd, Suite 360  
South Burlington, VT 05403

**SE Group**  
131 Church Street, 3rd Floor  
Burlington, VT 05401

**Construction Manager**  
www.pconstruction.com

**Consulting Architect**  
(802)-651-1283  
www.fllinc.com

**Structural Engineer**  
(802)-655-0755  
www.hardyse.com

**Mechanical Engineer**  
(802)-658-4891  
www.hallam-ics.com

**Civil Engineer**  
(802)-863-4225  
www.engineeringventures.com

**Geotechnical Engineer**  
(802)-652-5140  
www.geodesign.net

**Landscape Architect**  
(802)-862-0098  
www.segroup.com

NOT FOR CONSTRUCTION

Approval:

| Date       | No. | Description          |
|------------|-----|----------------------|
| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |

Project:

Burlington Town Center,  
Devonwood Investors, LLC

101 Cherry Street  
Burlington, VT 05401

Drawn By:

ELEVATIONS -  
CHERRY STREET &  
ST. PAULS STREET

Project Number: 1317-01

Client: CH

Checked By: JH/WF

Scale: AS NOTED

Drawing Number:

A-201



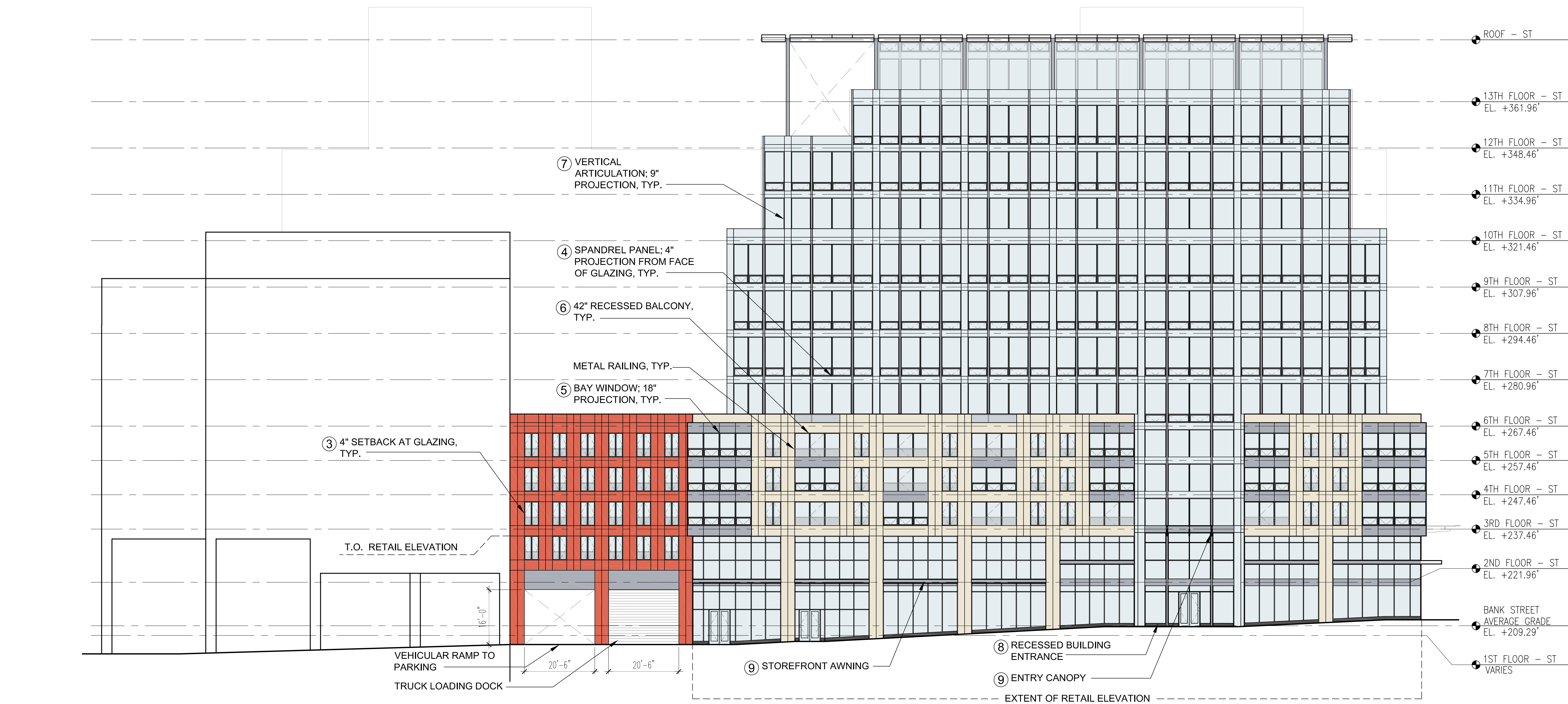
| BANK STREET FACADE: |                          |               |     |
|---------------------|--------------------------|---------------|-----|
|                     | AREA<br>(SQ.FT.)         | % OF<br>WHOLE |     |
| PRIMARY             | <b>TOTAL ELEVATION</b>   | <b>36,130</b> |     |
|                     | BRICK FACED PANEL        | 1,937         | 5   |
|                     | LIMESTONE FINISHED PANEL | 3,355         | 9   |
|                     | GLAZING                  | 28,278        | 78  |
|                     | STONE BASE               | 164           | < 1 |
| ACCENT              | METAL PANEL              | 2,396         | 7   |
|                     |                          |               |     |

| RETAIL ELEVATION ONLY |       |    |
|-----------------------|-------|----|
| GLAZING               | 4,523 | 77 |
| NON-GLAZING           | 1,382 | 23 |

| MATERIAL LEGEND |                                                 |
|-----------------|-------------------------------------------------|
| <div></div>     | PRIMARY MATERIAL 1:<br>BRICK FACED PANEL        |
| <div></div>     | PRIMARY MATERIAL 2:<br>BRICK FACED PANEL        |
| <div></div>     | PRIMARY MATERIAL 3:<br>LIMESTONE FINISHED PANEL |
| <div></div>     | PRIMARY MATERIAL 3:<br>GLAZING                  |
| <div></div>     | PRIMARY MATERIAL 4:<br>STONE BASE               |
| <div></div>     | ACCENT MATERIAL 1:<br>METAL PANEL               |

| PINE STREET FACADE: |                          |               |     |
|---------------------|--------------------------|---------------|-----|
|                     | AREA<br>(SQ.FT.)         | % OF<br>WHOLE |     |
| PRIMARY             | <b>TOTAL ELEVATION</b>   | <b>30,826</b> |     |
|                     | BRICK FACED PANEL        | 7,693         | 25  |
|                     | LIMESTONE FINISHED PANEL | 4,520         | 15  |
|                     | GLAZING                  | 15,081        | 49  |
|                     | STONE BASE               | 211           | < 1 |
| ACCENT              | METAL PANEL              | 3,321         | 11  |
|                     |                          |               |     |

| RETAIL ELEVATION ONLY |       |    |
|-----------------------|-------|----|
| GLAZING               | 4,352 | 75 |
| NON-GLAZING           | 1,420 | 25 |



01 BANK STREET ELEVATION  
1/16" = 1'0"



02 PINE STREET ELEVATION  
1/16" = 1'0"

|                                                                                             |                                                                        |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>PC Construction</b><br>153 Tilly Drive<br>South Burlington, VT 05403                     | <b>Construction Manager</b><br>(802)-651-1283<br>www.pconstruction.com |
| <b>Freeman French Freeman, Inc.</b><br>81 Maple Street<br>Burlington, VT 05401              | <b>Consulting Architect</b><br>(802)-864-6844<br>www.fffrc.com         |
| <b>Hardy Structural Engineering</b><br>875 Roosevelt Hwy, Suite 130<br>Colchester, VT 05446 | <b>Structural Engineer</b><br>(802)-655-0755<br>www.hardyse.com        |
| <b>Hallam ICS</b><br>38 Eastwood Drive, Suite 200<br>South Burlington, VT 05403             | <b>Mechanical Engineer</b><br>(802)-655-4891<br>www.hallam-ics.com     |
| <b>Engineering Ventures P.C.</b><br>208 Flynn Avenue, Suite 2A<br>Burlington, VT 05403      | <b>Civil Engineer</b><br>(802)-863-0225<br>www.engineeringventures.com |
| <b>GeoDesign</b><br>1233 Shelburne Rd, Suite 360<br>South Burlington, VT 05403              | <b>Geotechnical Engineer</b><br>(802)-652-5140<br>www.geodesign.net    |
| <b>SE Group</b><br>131 Church Street, 3rd Floor<br>Burlington, VT 05401                     | <b>Landscape Architect</b><br>(802)-862-0098<br>www.segroup.com        |

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|            |     |                      |
|------------|-----|----------------------|
| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |
| Date       | No. | Description          |

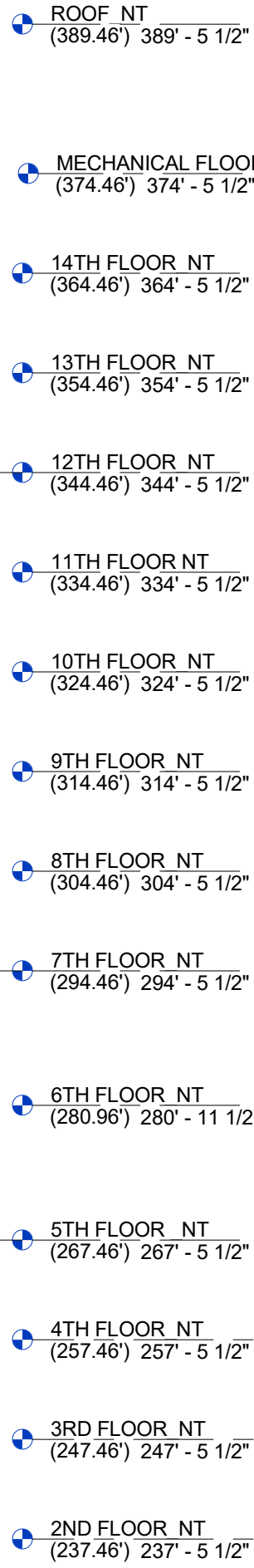
Burlington Town Center,  
Devonwood Investors, LLC

101 Cherry Street  
Burlington, VT 05401

ELEVATIONS -  
BANK STREET &  
PINE STREET

|                           |                  |
|---------------------------|------------------|
| Project Number<br>1317-01 | Signature & Seal |
| Drawn By<br>CH            |                  |
| Checked By<br>JH/WF       |                  |
| Scale<br>AS NOTED         |                  |





1  
A-101

|          |     |                    |
|----------|-----|--------------------|
| 12/15/16 |     | P&Z Submission     |
| 1/11/16  |     | P&Z Resubmission I |
| Date     | No. | Description        |

Burlington Town Center  
Devonwood Investors, LLC

01 Cherry Street  
Burlington, VT 05401

## BUILDING SECTION

|                 |                  |
|-----------------|------------------|
| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
| Checked By:     |                  |
| Checker         |                  |
| Scale:          |                  |
| 1/16" = 1'-0"   |                  |

A-211





**P** **K**  
**S** **B** +  
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NEW YORK, NY 100  
212 594 2010  
www.pksb.com

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South Burlington, VT 05403

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www.pcconstruction

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**Landscape Arch**  
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|            |    |                      |
|------------|----|----------------------|
| 1/11/2017  | 02 | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01 | P & Z SUBMISSION     |
| Date       | No | Description          |

| Date                    | NO. | Description |
|-------------------------|-----|-------------|
| Project                 |     |             |
| Burlington Town Center, |     |             |

Devonwood Investors, LL

101 Cherry Street  
Burlington, VT 05401

PERSPECTIVE VIEWS  
AERIAL VIEWS

|                                |                  |
|--------------------------------|------------------|
| Project Number:<br><br>1317-01 | Signature & Seal |
| Drawn By                       |                  |
| CHECKED BY                     |                  |
| Date:<br><br>AS NOTED          |                  |

Drawing Number: **A-401**





01 PERSPECTIVE VIEW — CORNER OF CHERRY AND ST PAUL  
NA



02 PERSPECTIVE VIEW — CORNER OF CHERRY AND PINE  
NA



03 PERSPECTIVE VIEW — CORNER OF BANK AND ST PAUL  
NA

**P K** PKSB ARCHITECTS,  
**+ S B** 330 WEST 42 STREET  
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www.segroup.com

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Approval:

Project:

1/11/2017 02 P & Z RESUBMISSION 1

12/15/2016 01 P & Z SUBMISSION

Date No. Description

Burlington Town Center,  
Devonwood Investors, LLC

101 Cherry Street  
Burlington, VT 05401

PERSPECTIVE VIEWS -  
STREET VIEWS

Project Number:  
1317-01

Drawn By:

Checked By:

Date:

AS NOTED

Drawing Number:  
A-402

Sheet:



BURLINGTON TOWN CENTER

BURLINGTON, VERMONT

PLANNING & ZONING SUBMISSION



| DRAWING INDEX - PLANNING & ZONING |                                                      |              |                 |
|-----------------------------------|------------------------------------------------------|--------------|-----------------|
| NUMBER                            | SHEET NAME                                           | FIRST ISSUED | LATEST REVISION |
| GENERAL                           |                                                      |              |                 |
| T-000                             | COVER SHEET                                          | 12/15/16     | 1/11/16         |
| CIVIL                             |                                                      |              |                 |
| C1.0                              | EXISTING & ADJUSTED PARCEL BOUNDARIES                | 12/15/16     | 12/15/16        |
| C1.1                              | EXISTING CONDITIONS PLAN                             | 12/15/16     | 12/15/16        |
| C1.2                              | DEMOLITION PLAN                                      | 12/15/16     | 12/15/16        |
| C1.3                              | SITE PLAN                                            | 12/15/16     | 12/15/16        |
| C1.4                              | GRADING PLAN                                         | 12/15/16     | 12/15/16        |
| C1.5                              | UTILITY PLAN                                         | 12/15/16     | 12/15/16        |
| C1.6                              | EROSION PREVENTION AND SEDIMENT CONTROL PLAN         | 12/15/16     | 12/15/16        |
| C2.1                              | ST. PAUL STREET PROFILE                              | 12/15/16     | 12/15/16        |
| C2.2                              | CHERRY STREET PROFILE                                | 12/15/16     | 12/15/16        |
| C2.3                              | PINE STREET PROFILE                                  | 12/15/16     | 12/15/16        |
| C2.4                              | BANK STREET PROFILE                                  | 12/15/16     | 12/15/16        |
| C2.5                              | ROAD SECTIONS                                        | 12/15/16     | 12/15/16        |
| C2.6                              | ROAD SECTIONS                                        | 12/15/16     | 12/15/16        |
| C3.0                              | SITE DETAILS AND NOTES                               | 12/15/16     | 12/15/16        |
| C3.1                              | WATER DETAILS AND NOTES                              | 12/15/16     | 12/15/16        |
| C3.2                              | SEWER DETAILS AND NOTES                              | 12/15/16     | 12/15/16        |
| C3.3                              | STORMWATER DETAILS                                   | 12/15/16     | 12/15/16        |
| C3.4                              | EROSION PREVENTION AND SEDIMENTATION CONTROL DETAILS | 12/15/16     | 12/15/16        |
| LANDSCAPE                         |                                                      |              |                 |
| LA-200                            | LAYOUT PLAN                                          | 12/15/16     | 12/15/16        |
| LA-400                            | PLANTING PLAN                                        | 12/15/16     | 12/15/16        |
| LA-500                            | LIGHTING PLAN / PHOTOMETRIC PLAN                     | 12/15/16     | 12/15/16        |
| DEMOLITION                        |                                                      |              |                 |
| AD-001                            | OVERALL DECONSTRUCTION PLAN                          | 12/15/16     | 12/15/16        |
| ZONING                            |                                                      |              |                 |
| Z-001                             | LOT COVERAGE DIAGRAMS I                              | 12/15/16     | 1/11/16         |
| Z-002                             | LOT COVERAGE DIAGRAMS II                             | 12/15/16     | 1/11/16         |
| Z-003                             | SITE PLAN                                            | 12/15/16     | 1/11/16         |
| Z-021                             | ZONING SECTIONS                                      | 12/15/16     | 1/11/16         |
| ARCHITECTURAL                     |                                                      |              |                 |
| A-051                             | FLOOR PLANS 1-4TH FLOOR                              | 12/15/16     | 1/11/16         |
| A-052                             | FLOOR PLANS 4TH-11TH FLOORS                          | 12/15/16     | 1/11/16         |
| A-053                             | FLOOR PLANS 12TH FLOOR - ROOF                        | 12/15/16     | 1/11/16         |
| A-201                             | ELEVATIONS - CHERRY STREET & ST. PAUL STREET         | 12/15/16     | 1/11/16         |
| A-202                             | ELEVATIONS - BANK STREET & PINE STREET               | 12/15/16     | 1/11/16         |
| A-211                             | BUILDING SECTION                                     | 12/15/16     | 1/11/16         |
| A-221                             | WALL SECTIONS I - CHERRY STREET                      | 12/15/16     | 12/15/16        |
| A-222                             | WALL SECTIONS II - CHERRY STREET                     | 12/15/16     | 12/15/16        |
| A-223                             | WALL SECTIONS III - CHERRY STREET                    | 12/15/16     | 12/15/16        |
| A-224                             | WALL SECTIONS IV - BANK STREET                       | 12/15/16     | 12/15/16        |
| A-225                             | WALL SECTIONS V - BANK STREET                        | 12/15/16     | 12/15/16        |
| A-226                             | WALL SECTIONS VI - BANK STREET                       | 12/15/16     | 12/15/16        |
| A-401                             | RENDERED PERSPECTIVES - AERIAL                       | 12/15/16     | 1/11/16         |
| A-402                             | RENDERED PERSPECTIVES - CORNER VIEWS                 | 12/15/16     | 1/11/16         |

**P K**  
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Approval

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| 12/15/16 |     | P&Z Submission     |  |
| 1/11/16  |     | P&Z Resubmission I |  |
| Date     | No. | Description        |  |

**Burlington Town Center**  
**Devonwood Investors, LLC**

101 Cherry Street  
Burlington, VT 05401

Drawing Title:

COVER SHEET

|                |                  |
|----------------|------------------|
| Project Number | Signature & Date |
| 1317-01        |                  |
| Drawn By       |                  |
| Designer       |                  |
| Checked By     |                  |
| Checker        |                  |
| Scale          |                  |

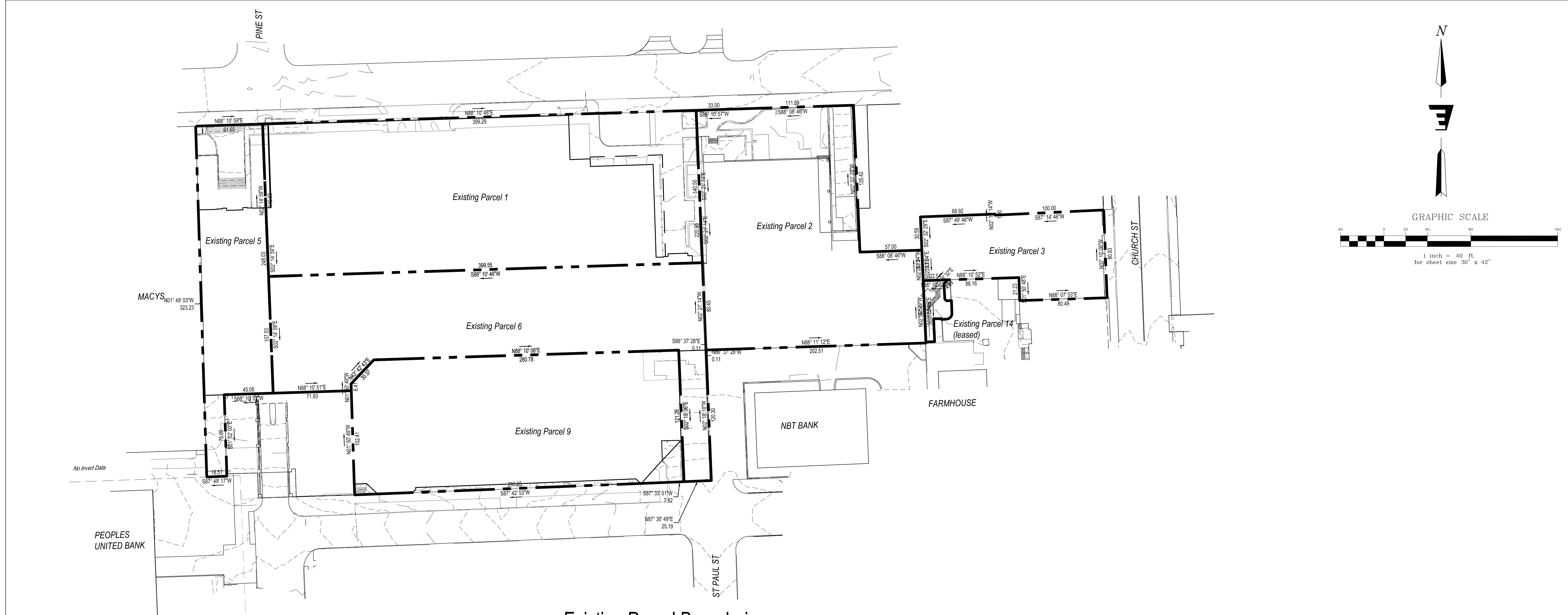
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T-000

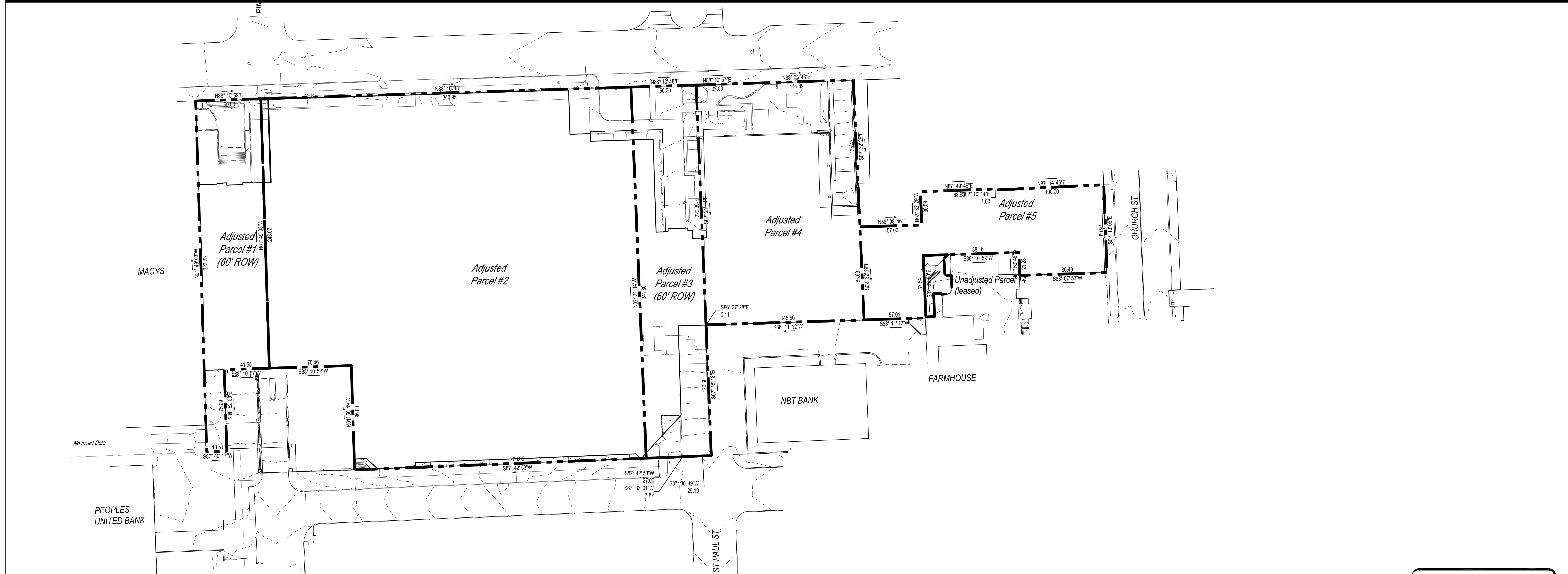
New Building Application Number

Drawing





Existing Parcel Boundaries



Proposed Adjusted Parcel Boundaries

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Approval

| Date       | No. | Description      |
|------------|-----|------------------|
| 12/15/2016 | 1   | P & Z Submission |
|            |     |                  |
|            |     |                  |
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|            |     |                  |
|            |     |                  |
|            |     |                  |

Burlington Town Center  
Devonwood Investors

75 Cherry Street  
Burlington, VT 05401

Drawing Title

Existing & Adjusted  
Parcel Boundaries

| Project Number | Revision & Date |
|----------------|-----------------|
| 1317-01        |                 |
| Drawn By       |                 |
| WCJZ           |                 |
| Checked By     |                 |
| JZ/KW          |                 |
| Scale          |                 |
| As Noted       |                 |
| Drawing Number |                 |

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12/15/16

C1.0













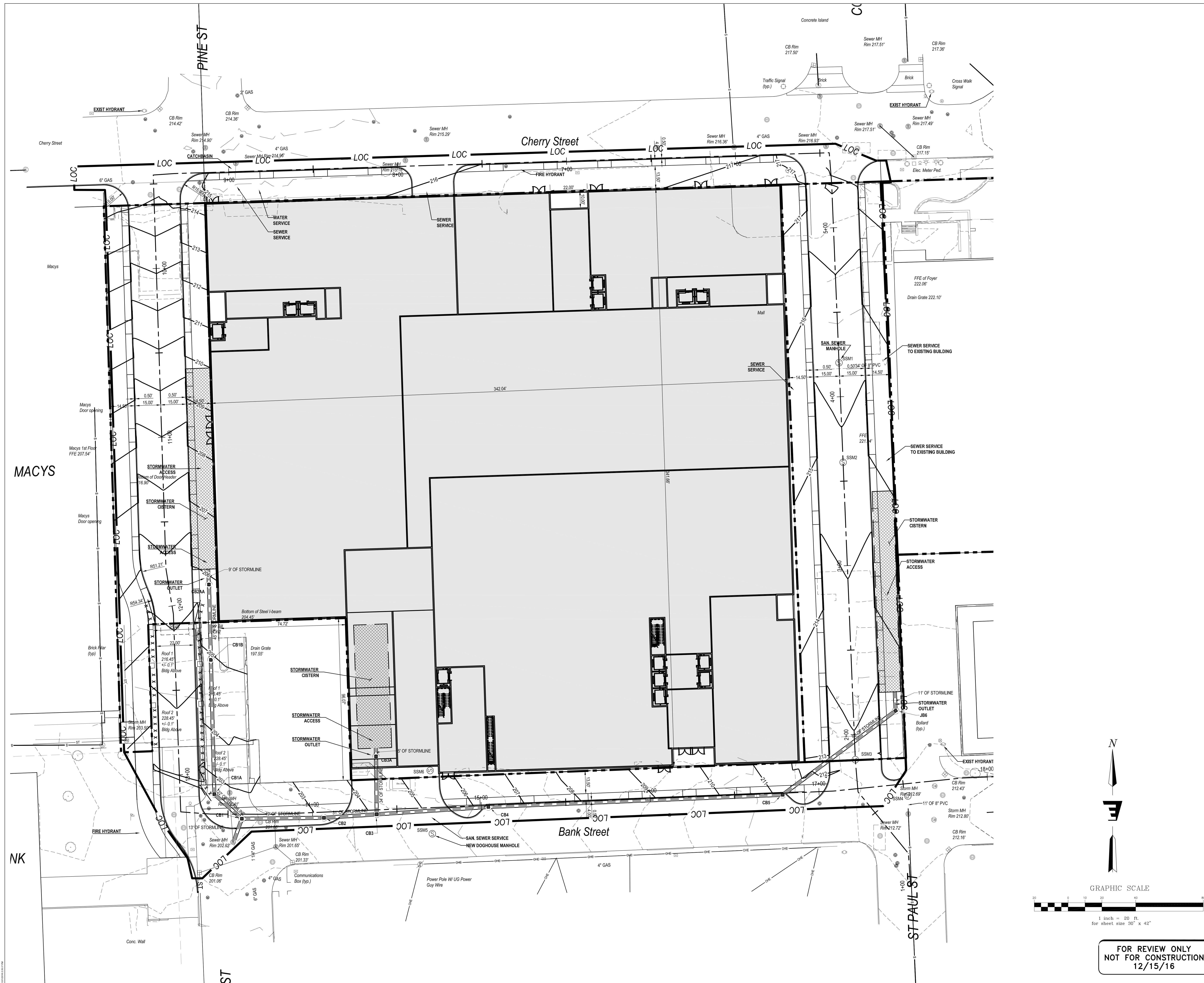


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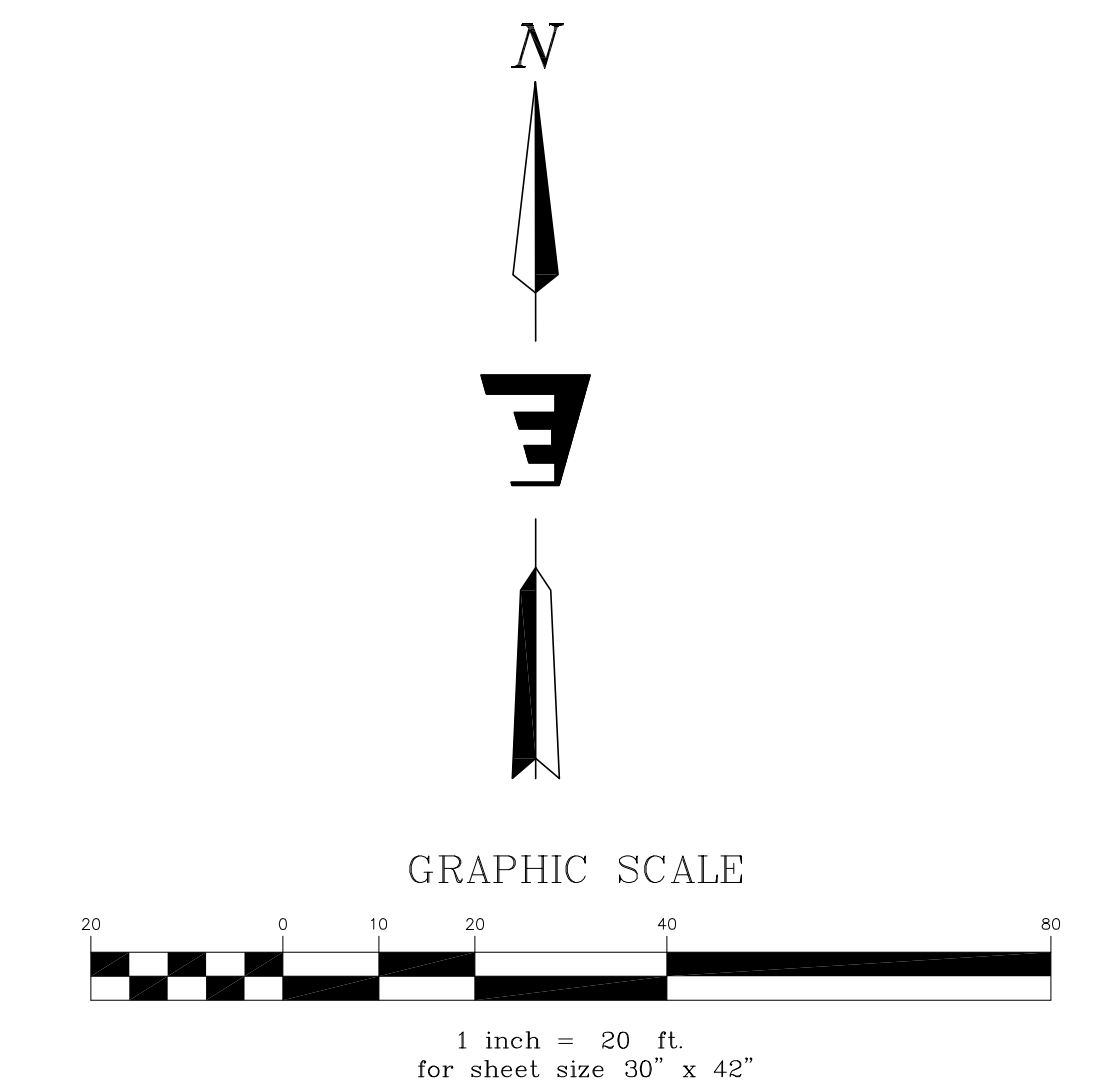
75 Cherry Street  
Burlington, VT 05401

|                |                  |
|----------------|------------------|
| Project Number | Signature & Seal |
| 1317-01        |                  |
| Drawn By       |                  |
| WC/JZ          |                  |
| Checked By     |                  |
| JZ/KW          |                  |
| Scale          |                  |
| As Noted       |                  |

# C1.4

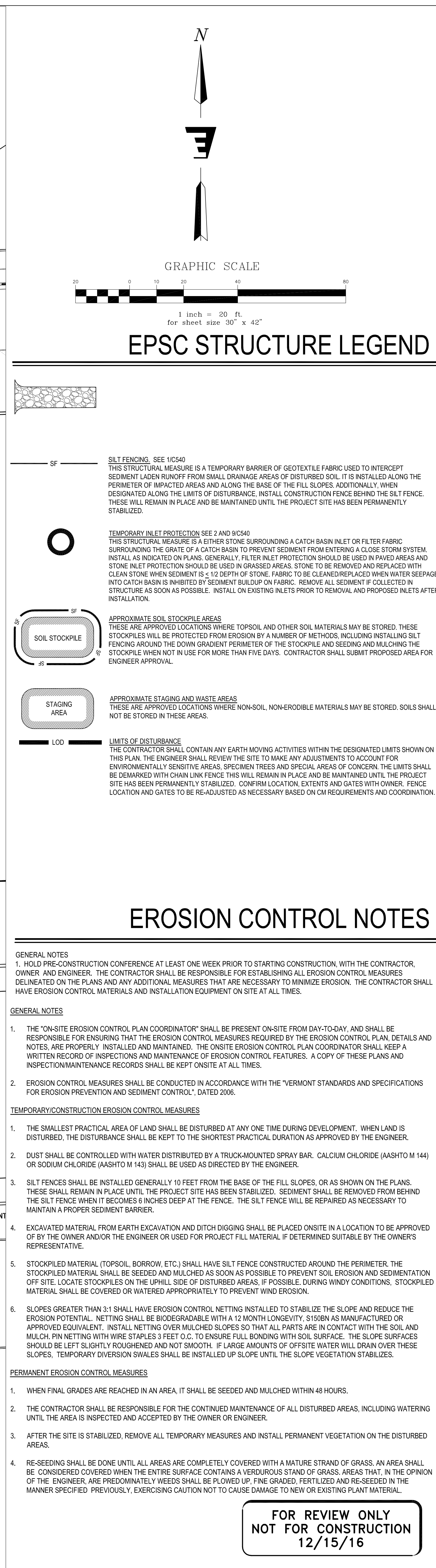






## C1.5







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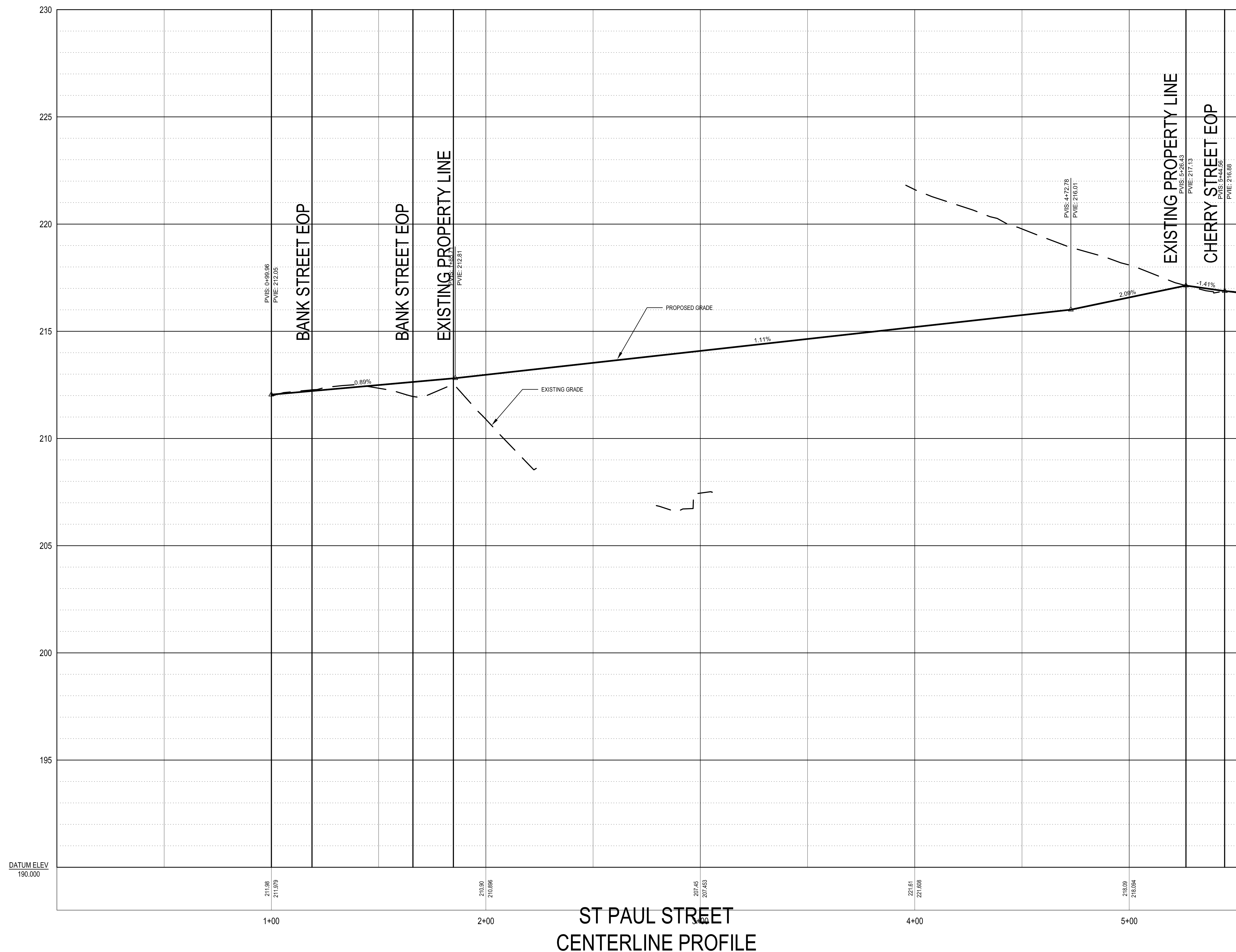
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# ST PAUL STREET CENTERLINE PROFILE

NOT FOR CONSTRUCTION

|            |     |                  |
|------------|-----|------------------|
| 12/15/2016 | 1   | P & Z Submission |
|            |     |                  |
|            |     |                  |
|            |     |                  |
|            |     |                  |
|            |     |                  |
|            |     |                  |
|            |     |                  |
| Date       | No. | Description      |

Burlington Town Center  
Devonwood Investors

75 Cherry Street  
Burlington, VT 05401

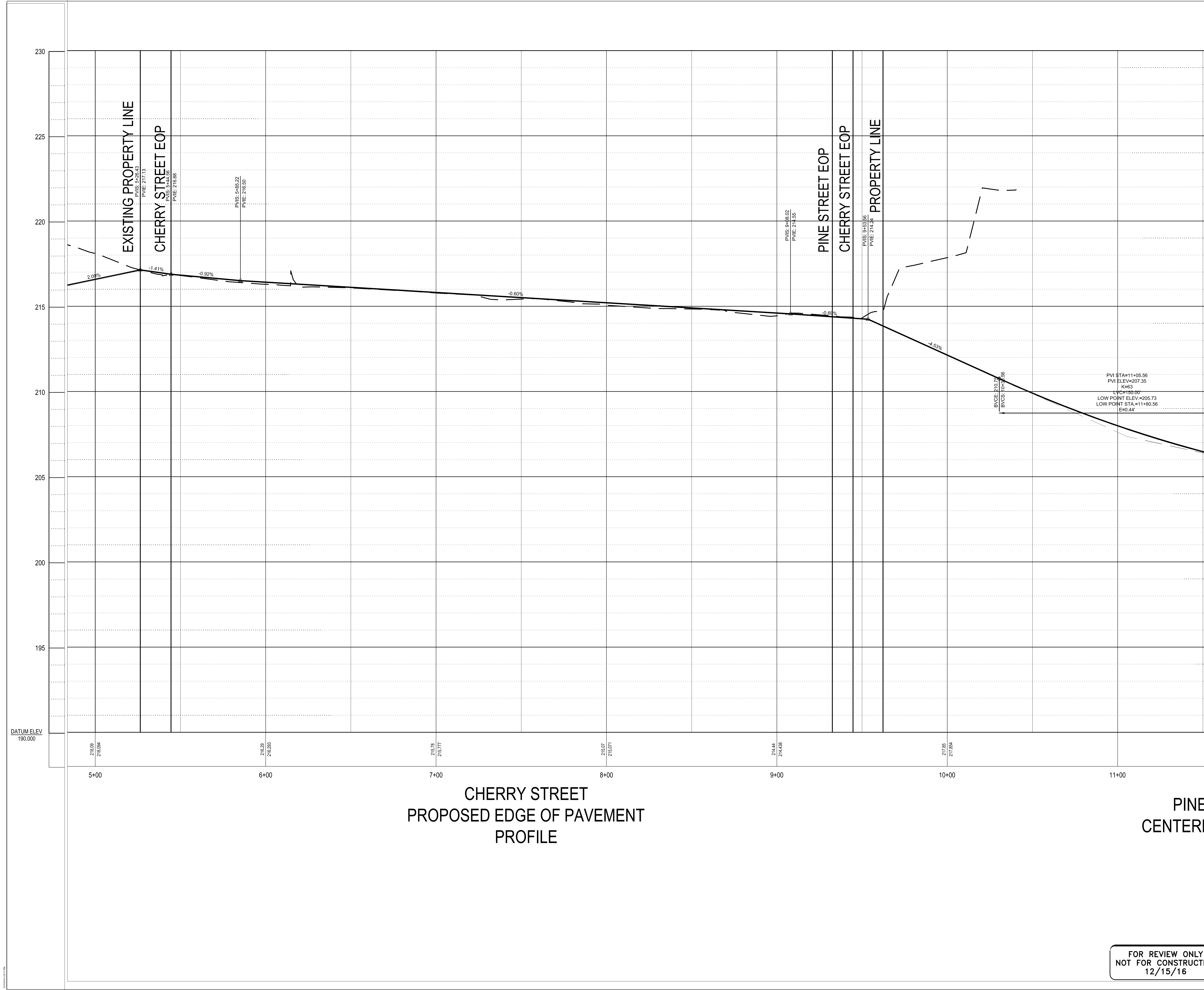
## ST PAUL STREET PROFILE

|                 |                   |
|-----------------|-------------------|
| Project Number: | Signature & Date: |
| 1317-01         |                   |
| Drawn By:       |                   |
| WC/JZ           |                   |
| Checked By:     |                   |
| JZ/KW           |                   |
| Scale:          |                   |
| As Noted        |                   |

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12/15/16

## C2.1





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**Civil Engineer**  
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**Geotechnical Engineer**  
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www.geodesign.net

**Landscape Architect**  
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| Approval   |     |                  |
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| 12/15/2016 | 1   | P & Z Submission |
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| Date       | No. | Description      |

**Burlington Town Center**  
Devonwood Investors

75 Cherry Street  
Burlington, VT 05401

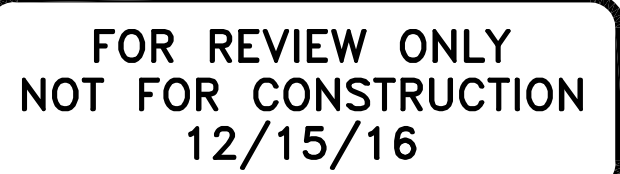
**CHERRY STREET  
PROFILE**

|                |                  |
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| Project Number | Signature & Date |
| 1317-01        |                  |
| Drawn By       |                  |
| WCJZ           |                  |
| Checked By     |                  |
| JZ/KW          |                  |
| Scale          |                  |
| As Noted       |                  |
| Drawing Number |                  |

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C2.2



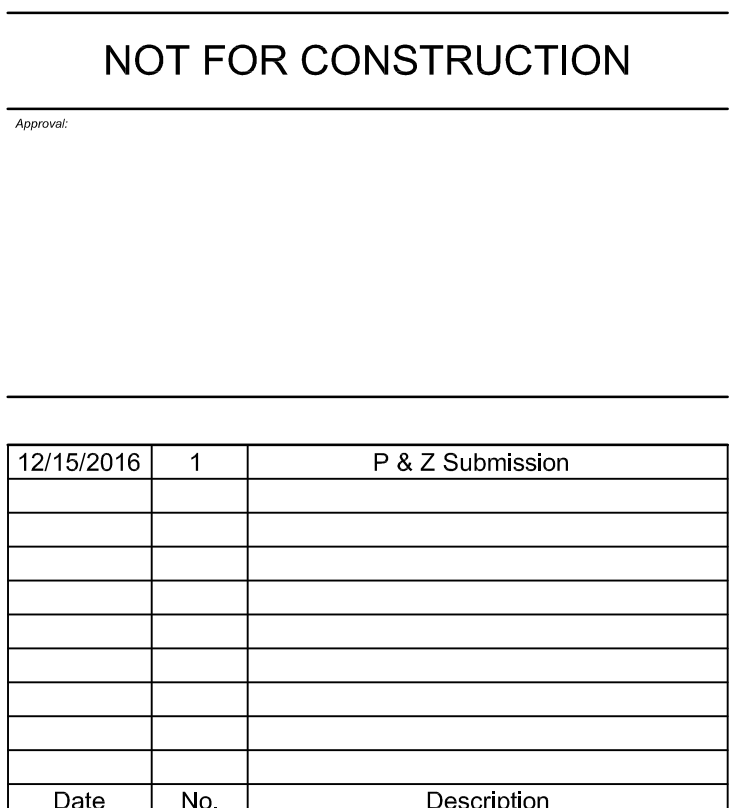






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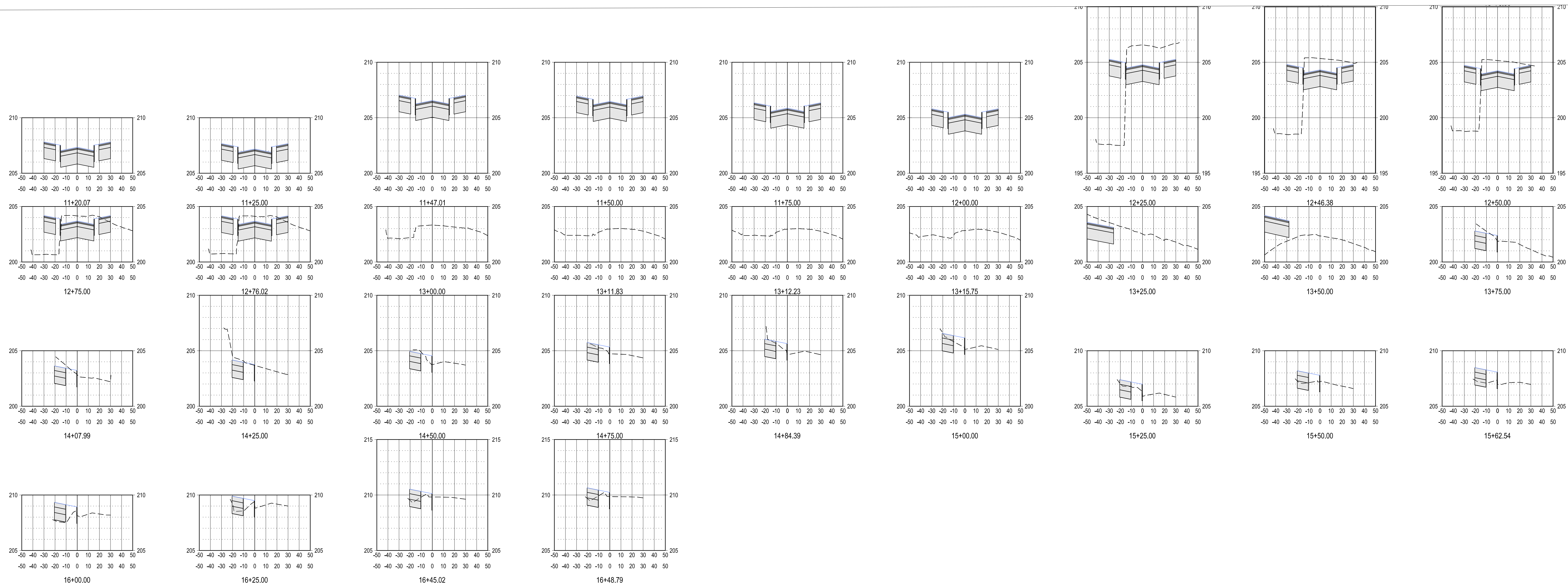


75 Cherry Street  
Burlington, VT 05401

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| Project Number | Signature & Seal |
| 1317-01        |                  |
| Drawn By:      |                  |
| WC/JZ          |                  |
| Checked By:    |                  |
| JZ/KW          |                  |
| Scale:         |                  |
| As Noted       |                  |

## C2.5





*Approved:*

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| 12/15/2016 | 1   | P & Z Submission |
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| Date       | No. | Description      |

75 Cherry Street  
Burlington, VT 05401

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| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| WC/JZ           |                  |
| Checked By:     |                  |
| JZ/KW           |                  |
| Scale:          |                  |
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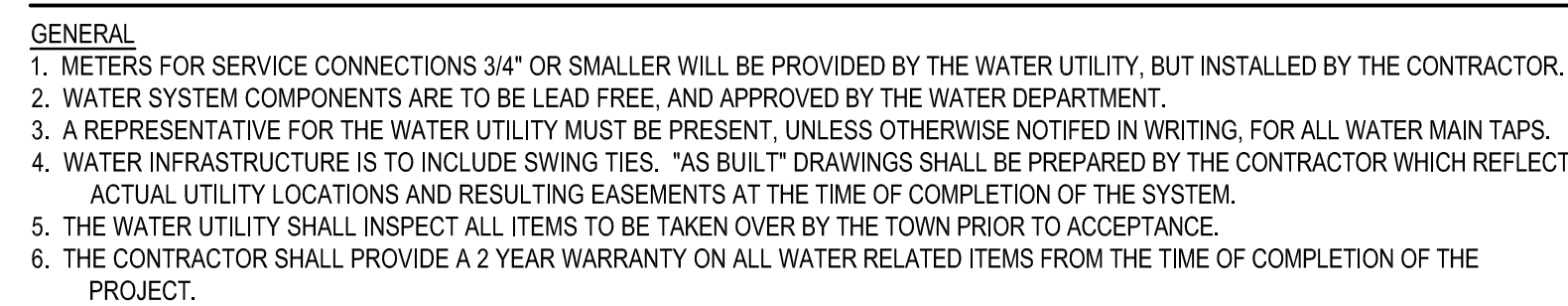
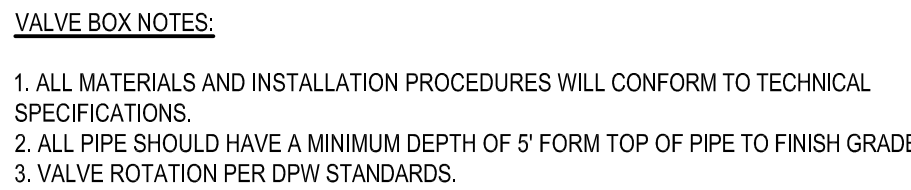
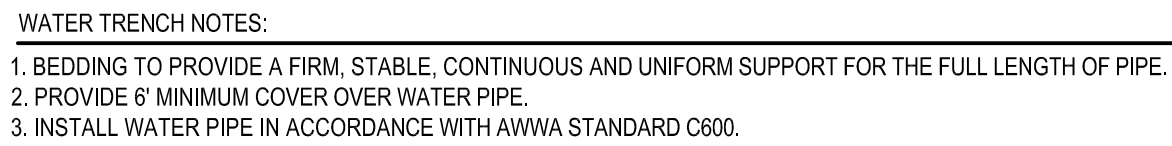
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## C2.6









1. LOCATION OF UTILITIES AND UNDERGROUND STRUCTURES ARE SHOWN AS APPROXIMATE ON THE CONTRACT DOCUMENTS
2. ALL UTILITIES SHALL BE LOCATED BY THE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
3. EXISTING UTILITIES SHALL BE PROTECTED AND SUPPORTED DURING CONSTRUCTION.
4. ALL WATER, GAS, CABLE, TELEPHONE, ELECTRIC, SEWER, AND OTHER UTILITIES FOUND TO INTERFERE WITH THE PROPOSED CONSTRUCTION SHALL BE RELOCATED IN A MANNER ACCEPTABLE TO THE ENGINEER.

1. SAND BEDDING MEETING REQUIREMENTS OF EARTHWORK SPECIFICATIONS
2. SAND BLANKET MEETING REQUIREMENTS OF EARTHWORK SPECIFICATIONS
3. FINAL FINAL BACKFILL MATERIAL - MATERIAL WILL EXCLUDE PIECES OF PAVEMENT, ORGANIC MATTER, TOP SOIL, ALL WET OR SOFT MUCK, PEAT, CLAY, LARGE ROCKS (12" DIMENSION), OR ANY MATERIAL DETERMINED BY THE ENGINEER THAT WILL NOT BE SUITABLE

1. ONCE INSTALLED PERFORM A HYDROSTATIC AND LEAKAGE TEST ACCORDING TO AWWA C600(LATEST REVISION) ON EACH PIPE LINE.
2. THE ENGINEER AND THE WATER UTILITY SHALL BE GIVEN AT LEAST 72 HOURS NOTICE BEFORE THE TEST IS CONDUCTED. TEST MUST BE WITNESSED BY THE ENGINEER.
3. SPECIFIED TEST PRESSURE IS 200 PSI, AND PRESSURE DURING TEST SHALL NOT VARY BY MORE THAN 5 PSI.

**DUCTILE IRON PIPE, AWWA C151**

- 1. FITTINGS: CAST IRON, STANDARD THICKNESS, 350 psi PRESSURE RATING. (AWWA C110, C115, C105, ANSI A21.10).
- 2. FITTINGS: CAST IRON, 250 psi PRESSURE RATING (ANSI A21.10).
- 3. JOINTS: MECHANICAL, PUSH-ON AND FLANGED (AWWA C111, C115).
- 4. GASKETS:
  - A. MECHANICAL AND PUSH-ON JOINTS, ANSI A21.1.
  - F. FLANGED JOINTS: -2" THICK RING OR FULL FACED RUBBER, ANSI A21.5.
- 5. BOLTS/NUTS:
  - A. MECHANICAL JOINT, ANSI A21.1.1.
  - F. FLANGED JOINT, ANSI A21.5.
- 6. MECHANICAL JOINT GLANDS SHALL BE "MEEGA-LUG" RETAINER GLANDS.
- 7. LININGS AND LINING REPAIR TO AWWA/C104.
- 8. INTERIOR - CEMENT LINED. DOUBLE THICKNESS BITUMINOUS SEAL.
  - A. EXTERIOR - BITUMINOUS COATING APPROXIMATELY 2 MILS THICK, ANSI A21.5, ANSI A21.5, AND ANSI A21.10.
  - C. FLANGE MACHINED FACE COATING, ANSI A21.5.

1. TYPE-A, ANNEALED, ASTM B88
2. FITTINGS: ASME B16.18, CAST COPPER, OR ASME B16.22, WROUGHT COPPER.
3. JOINTS: COMPRESSION CONNECTION OR AWS A5.8, BCUP SILVER BRAZE.

CHLORINATION OF DOMESTIC WATER LINES

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE WATER UTILITY AT LEAST 72 HOURS IN ADVANCE OF BEGINNING ANY DISINFECTION OF WATER MAINS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR BACTERIOLOGICAL TESTING AS REQUIRED BY THIS SPECIFICATION AND REFERENCE STANDARDS MENTIONED.
3. DISINFECT ALL NEW PIPELINE SYSTEMS IN ACCORDANCE WITH AWWA C651, INCLUDING:
  - A. METHOD OF CHLORINE APPLICATION, USE CONTINUOUS FLOW METHOD OR SLUG METHOD. (TABLE METHOD IS NOT ACCEPTABLE.)
  - B. FORM OF CHLORINE UTILIZED.
  - C. FINAL FLUSHING.
  - D. BACTERIOLOGICAL TESTING
  - E. REPEITION OF PROCEDURE

1. RESILIENT SEAT GATE VALVES BY KENNEDY "KEN-SEAL" OR EQUIV.
2. IRON BODY GATE VALVES TO MEET AWWA C-509-87.
3. STEM CONSTRUCTION: NON-RISING.
4. STEM SEALS: DOUBLE O-RING.
5. GATE: CAST IRON RESILIENT WEDGE WITH SYNTHETIC ELASTOMER COATING, AND SHALL BE EPOXY COATED (FUSION BONDED) INSIDE AND OUT.
6. BONNET HARDWARE SHALL MEET ASTM A307, CADMIUM PLATED.
7. OUTLET CONNECTION: STANDARD MECHANICAL JOINT
8. OPERATION: OPEN TO THE RIGHT.

**TAPPING VALVES**

1. TAPPING VALVES TO MEET ANSI/AWWA C509-87, STANDARD FOR RESILIENT SEATED GATE VALVES.
2. VALVES SHALL HAVE A MINIMUM WORKING PRESSURE OF 150 PSI.
3. VALVES SHALL OPEN RIGHT (CONFIRM WITH DPW).
4. INLET FLANGES SHALL BE CLASS 125, ANSI B16.1, OR ANSI/AWWA C110/A21.10.
5. OUTLET CONNECTION: STANDARDIZED MECHANICAL JOINT.

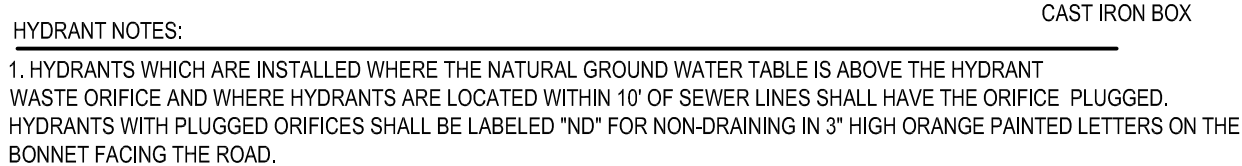
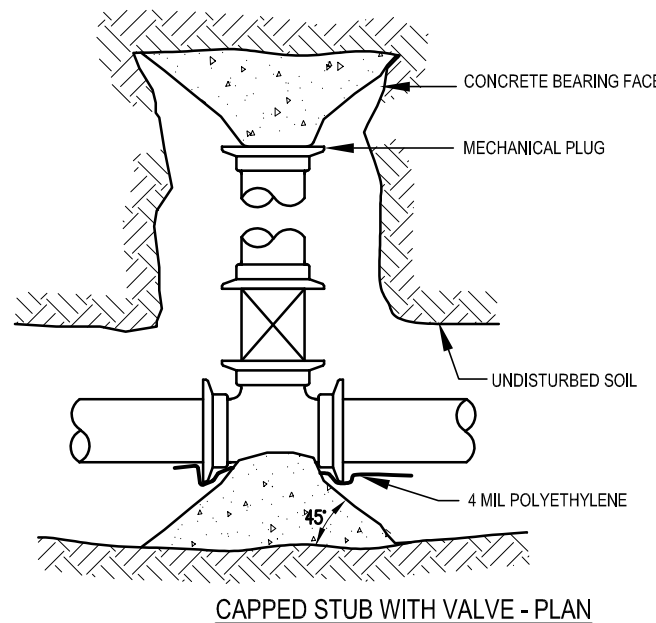
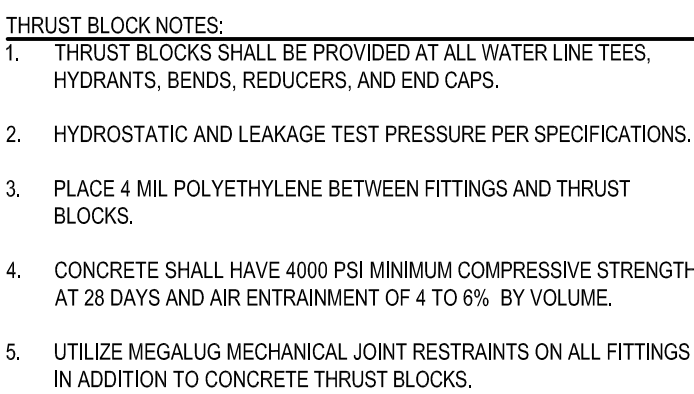
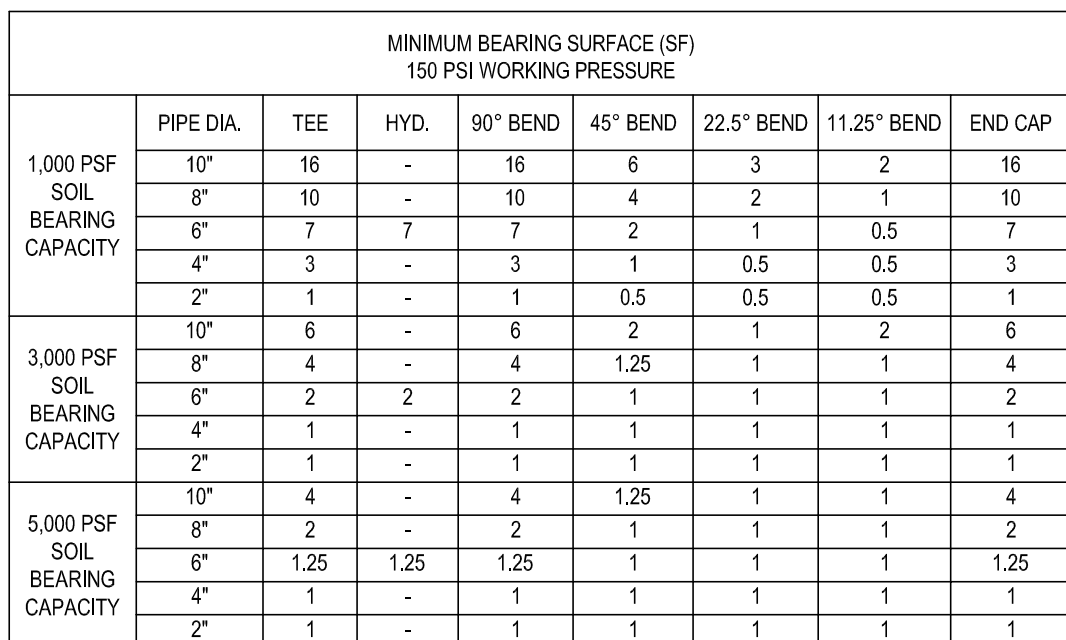
7. STEM CONSTRUCTION: NON-RISEING.  
8. SEATING: PARALLEL SEAT  
9. END CONNECTIONS: MECHANICAL ON RUN, FLANGED ON BRANCH.  
10. BURIED TAPPING VALVES SHALL BE PROVIDED WITH A 2 INCH SQUARE WRENCH NUT AND CAST IRON VALVE BOX. IF DEPTH FROM GRADE TO TOP OF VALVE OPERATING NUT IS GREATER THAN 6'-0" A VALVE STEM RISER MADE OF HIGH STRENGTH STEEL SHALL BE PROVIDED, DEP FROM VALVE STEM RISER NUT TO GRADE WILL BE 4 TO 6 FEET.

1. AWWA C502, LATEST REVISION.
2. AWWA C207, CLASS D, MAX. WORKING PRESSURE OF 150 PSI.
3. SLEEVES: 3/4" NPT SLEEVES OF CAST IRON OR DUCTILE IRON.
4. MECHANICAL JOINT ENDS WITH END AND GASKET SEALS.
5. PROVIDE A 3" SPI TEST PIPES CL OR OTHER PROVISION FOR AIR TESTING THE VALVE AND JOINT AT MAXIMUM WORKING PRESSURE.
6. BOLTS AND NUTS, MECHANICAL JOINTS: HIGH STRENGTH CAST IRON OR HIGH STRENGTH LOW ALLOY STEEL. ANSIAWMA C1102/1-11/20, APPENDIX A.
7. BOLTS AND NUTS, FLANGED JOINTS: HIGH STRENGTH, LOW CARBON STEEL, CONFORMING TO ANSIAWMA C1102/1-11/20, APPENDIX A.
8. COAT ALL BOLTS AND NUTS WITH A RUST RESISTANT LUBRICANT.
9. ALL BOLTS AND NUTS USED WITH PIPE SLEEVES SHALL BE BRUSH COATED HEAVILY AFTER FINAL TIGHTENING WITH BITUMASTIC COAT-APPLIED MATERIAL TO THOROUGHLY COVER ALL EXPOSED SURFACES OF BOLTS AND NUTS.

1. ACCEPTABLE MANUFACTURER'S: MUELLER, CLOW, OR EQUAL.
2. CLOW F-2452 SLIDING TYPE, TWO PIECE, OR EQUAL.
3. 5 1/4 INCH SHAFT.
4. SIZE 664-A (40-60 INCH OVERALL LENGTH).
5. CAST IRON.
6. CLOW F-2490 LIDS OR EQUAL.
7. THE WORD "WATER" TO BE CAST INTO TOP OF COVERS, AND ARROW SHOWING DIRECTION OF OPENING.



NOTE:  
THE CITY OF BURLINGTON HOLDS THE RIGHT OF FIRST  
REFUSAL FOR ALL WATER SYSTEM WORK. COORDINATE  
WITH PUBLIC WORKS DEPARTMENT.



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### C3.1

*Agreement*

[illegible]

75 Cherry Street  
Burlington, VT 05401

## Water Details and Notes

|                |                  |
|----------------|------------------|
| Project Number | Signature & Seal |
| 1317-01        |                  |
| Drawn By:      |                  |
| WC/JZ          |                  |
| Checked By:    |                  |
| JZ/KW          |                  |
| Scale:         |                  |
| As Noted       |                  |



DEPENDING ON WASTEWATER FLOW, IT MAY BE NECESSARY PLUG AN UPSTREAM MANHOLE AND PUMP WASTEWATER TO THE NEXT DOWNSLOPE STRUCTURE DURING MANHOLE INSTALLATION.

CONTRACTOR SHALL CONFORM TO GUIDELINES DETAILED IN THE VERNON STATE SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR READING AND FOLLOWING THE FULL COMPLETE EDITION PROVIDED BY THE STATE.

BUILDING SEWERS MUST BE CONSTRUCTED IN A MANNER WHICH WILL PREVENT LEAKING, BREAKING OR CLOGGING.

SIZE AND SLOPE: MINIMUM BUILDING SEWER SIZE IS 4 INCHES (UNLESS SHOWN ON THE PLAN) AND A MINIMUM SLOPE IS 1/4" PER FOOT.

CLEANOUTS: CLEANOUTS SHALL BE PROVIDED AT EACH HORIZONTAL CHANGE IN DIRECTION OF THE BUILDING SEWER GREATER THAN 45 DEGREES AND WHERE INDICATED ON THE DESIGN DRAWINGS. BUILDING SEWER CHANGES IN DIRECTION WHICH EXCEED 45 DEGREES SHOULD BE MADE WITH TWO 45 DEGREE ELBS OR LONG SWEEP FITTINGS. MANHOLES ARE ACCEPTABLE IN LIEU OF CLEANOUTS. WHERE BUILDING SEWERS ARE TO BE INSTALLED AT A DEPTH OF LESS THAN 5 FEET UNDER DRIVEWAYS ARE ANTICIPATED, EXTRA HEAVY CAST IRON PIPE SHALL BE USED.

LEAKAGE: BUILDING SEWERS SHALL MEET THE LEAKAGE STANDARDS PRESCRIBED IN THE STATE OF VERMONT SPECIFICATIONS (EPR- CHAPTER 1). SEE BELOW FOR MORE DETAIL.

| SLOPE, VELOCITY: ALL GRAVITY SEWER LINES SHALL BE INSTALLED WITH NOT LESS THAN THE SLOPES SHOWN BELOW: |                       |
|--------------------------------------------------------------------------------------------------------|-----------------------|
| PIPE SIZE (INCHES)                                                                                     | SLOPE (FEET/100 FEET) |
| 4"                                                                                                     | 2%                    |
| 6"                                                                                                     | 1%                    |
| 8"                                                                                                     | 0.4%                  |

CHANGES IN PIPE SIZE: WHEN A SMALLER SEWER JOINS A LARGER ONE, THE INVERT OF THE LARGER SEWER SHALL BE LOWERED SUFFICIENTLY TO MAINTAIN THE SAME ENERGY GRADIENT.

MATERIAL: PVC SDR 35, ASTM D3034, WITH PUSH-ON GASKETED JOINTS. GASKETS SHALL CONFORM TO ASTM D2122. SEWER JOINTS SHALL BE CONSTRUCTED TO MINIMIZE INFILTRATION AND TO PREVENT THE ENTRANCE OF ROOTS INTO THE SYSTEM.

TRENCHING: LEDGE, ROCK, BouldERS AND LARGE STONES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF FOUR INCHES BELOW AND ON EACH SIDE OF ALL PIPES.

BEDDING: SEE TRENCH DETAIL DRAWING FOR MATERIALS. TRENCH BACKFILL SHALL BE OF A SUITABLE NATIVE MATERIAL FREE FROM DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONES, ORGANIC MATTER, OR OTHER UNSTABLE MATERIALS.

LEAKAGE TESTS: UPON COMPLETION OF SEWER LINE CONSTRUCTION, THE SEWER LINE SHALL BE TESTED IN ACCORDANCE WITH THE STATE OF VERMONT SPECIFICATIONS (EPR - CHAPTER 1, APPENDIX "A").

LEAKAGE TESTS FOR GRAVITY SEWERS

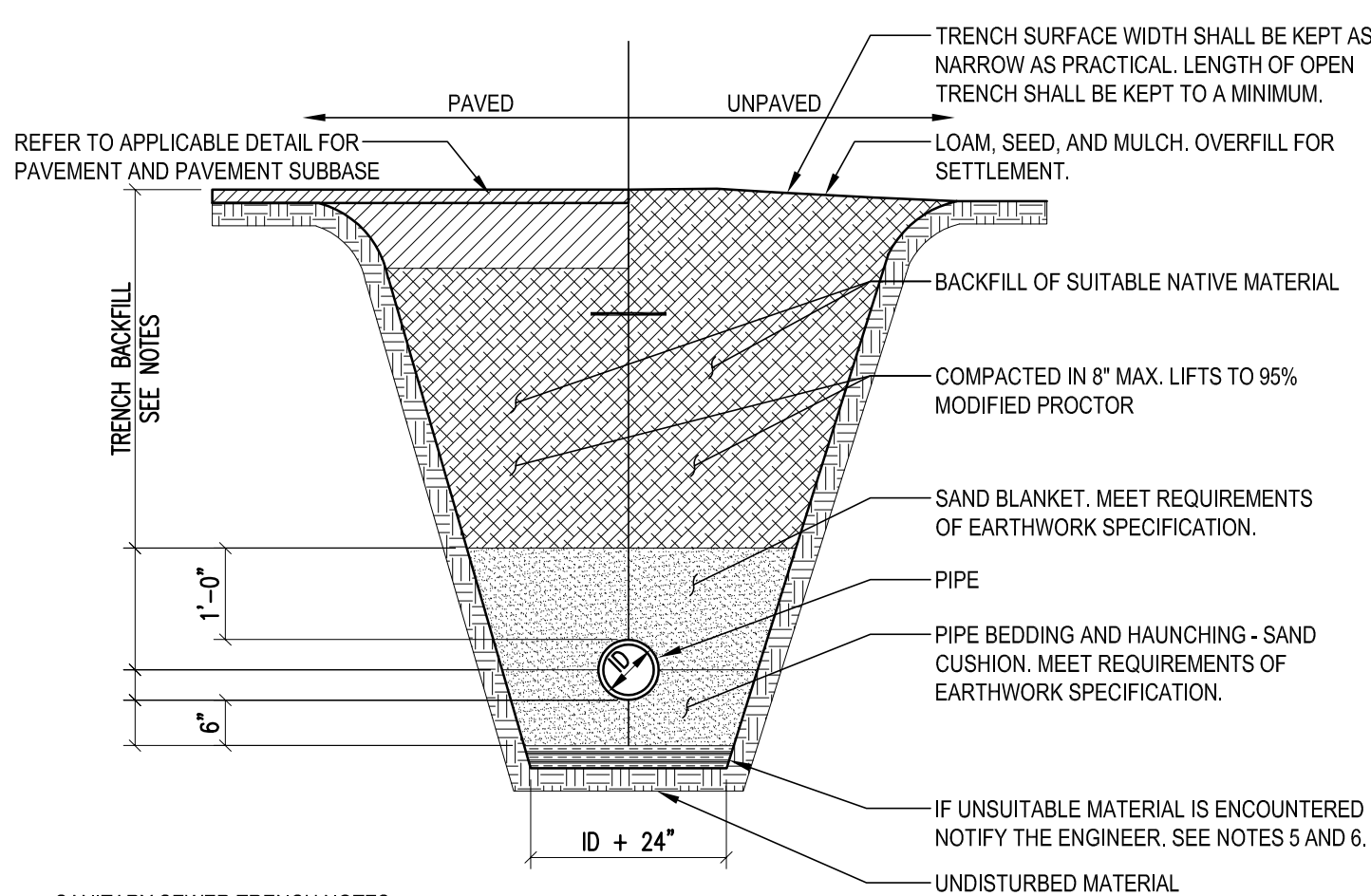
PLUG ALL OPENINGS IN THE TEST SECTION. ADD AIR UNTIL THE INTERNAL PRESSURE OF THE LINE IS RAISED TO APPROXIMATELY 4.0 POUNDS/SQUARE INCH (PSI) GREATER THAN THE AVERAGE PRESSURE OF ANY GROUND WATER. AFTER THIS PRESSURE IS REACHED, ALLOW THE PRESSURE TO STABILIZE. THE PRESSURE WILL NORMALLY DROP AS THE AIR TEMPERATURE STABILIZES. THIS USUALLY TAKES 2 TO 5 MINUTES DEPENDING ON THE PIPE SIZE. THE PRESSURE MAY BE REDUCED TO 3.5 PSI BEFORE STARTING THE TEST.

| PIPE SIZE (IN) | T (TIME) (MIN./100FT) |
|----------------|-----------------------|
| 3              | 0.2                   |
| 4              | 0.3                   |
| 6              | 0.7                   |
| 8              | 1.2                   |

- INSTALLATION:** PIPE SHALL BE LAID WITH BELL ENDS FACING UPGRADE AND LAYING SHALL START AT THE DOWNGRADE POINT.
- 4. WATER LINE SEPARATION**
- a. **HORIZONTAL SEPARATION:** SEWERS SHALL BE LAID FLAT AT LEAST TEN FEET HORIZONTAL FROM ANY EXISTING OR PROPOSED WATER MAIN. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE.
- WHERE IMPOSSIBLE OR IMPRACTICABLE TO MAINTAIN THE TEN FOOT SEWER/WATER PIPE HORIZONTAL SEPARATION, DUE TO LEDGE, BOUNDERS OR OTHER UNUSUAL CONDITIONS) THE WATER LINE MAY BE IN A SEPARATE TRENCH OR ON AN EARTH SHELf IF THE SEWER TRENCH PROVIDED THAT THE BOTTOM OF THE WATER LINE IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER, WHEREVER IMPOSSIBLE OR IMPRACTICAL TO MAINTAIN THE 18 INCH VERTICAL SEPARATION, THE SEWER LINE SHALL BE CONSTRUCTED USING PRESSURE PIPE TO NORMAL WATER LINE STANDARDS AND PRESSURE TESTED TO 50 PSI FOR 15 MINUTE PRIOR TO BACKFILLING.
- b. **CROSSINGS:** SEWERS CROSSING WATER MAINS SHALL BE LAID BENEATH THE WATER MAIN WITH AT LEAST 18 INCHES VERTICAL CLEARANCE BETWEEN THE OUTSIDE OF THE SEWER AND THE OUTSIDE OF THE WATER MAIN, WHEN IT IS IMPOSSIBLE TO MAINTAIN THE 18 INCH VERTICAL SEPARATION, THE CROSSING SHALL BE ARRANGED SUCH THAT ONE FULL LENGTH OF SEWER IS CENTERED ABOVE OR BELOW THE WATER LINE WITH SEWER JOINTS AS FAR AWAY AS POSSIBLE FROM WATER JOINTS.
- c. THE SEWER PIPE MUST BE CONSTRUCTED TO WATER MAIN STANDARDS FOR A MINIMUM DISTANCE OF 20 FEET EITHER SIDE OF THE CROSSING OR AT LEAST THREE FULL LENGTHS, WHICHEVER IS GREATER.
- d. THE SECTION CONSTRUCTED TO WATER MAIN STANDARDS MUST BE PRESSURE TESTED TO MAINTAIN 50 PSI FOR 15 MINUTES WITHOUT LEAKAGE PRIOR TO BACKFILLING BEYOND ONE FOOT ABOVE THE PIPE TO ASSURE WATER TIGHTNESS.
- e. WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO PREVENT DAMAGE TO THE WATER MAIN.
- 5. MANHOLES**
- a. **DIAMETERS:** THE MINIMUM DIAMETER OF MANHOLES SHALL BE 48 INCHES. LARGE DIAMETERS ARE PREFERRED FOR CONNECTION TO LARGE DIAMETER SEWERS. A MINIMUM ACCESS DIAMETER OF 24 INCHES SHALL BE PROVIDED.
- b. **FLOW CHANNEL:** FLOW CHANNELS SHALL BE PROVIDED IN THE BASE OF ALL MANHOLES AND THE FLOW CHANNEL, THROUGH MANHOLES SHOULD BE MADE TO CONFORM IN SHAPE AND SLOPE TO THAT OF THE SEWERS.
- c. **MANHOLE SLABS** SHALL BE OF THE PRE-CAST CONCRETE OR POUR-IN-PLACE CONCRETE TYPE. MANHOLES SHALL BE WATERPROOFED ON THE EXTERIOR.
- d. INLET AND OUTLET PIPES SHALL BE JOINED TO THE MANHOLE WITH A RUBBER-GASKETED FLEXIBLE WATERTIGHT CONNECTION THAT ALLOWS DIFFERENTIAL SETTLEMENT OF THE PIPE AND MANHOLE WALL TO TAKE PLACE.
- e. ALL MANHOLES SHALL BE TESTED FOR LEAKAGE. LEAKAGE TESTING OF GRAVITY SEWERS UTILIZING THE WATER TESTING PROCEDURES TAKES INTO ACCOUNT THE LEAKAGE FROM ONE MANHOLE IN THE TEST SECTION. OTHERWISE, MANHOLES SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH THE FOLLOWING PROCEDURE:
1. PRIOR TO THE MANHOLE HAS BEEN ASSEMBLED IN PLACE. ALL LIFTING HOLES AND EXTERIOR JOINTS SHALL BE FILLED WITH AND POINTED WITH AN APPROPRIATE CURING MORTAR. ALL PIPES AND OTHER OPENINGS IN THE MANHOLE SHALL BE SUITABLY PLUGGED AND THE PLUGS PLACED TO PREVENT BLOWOUT.
- EACH MANHOLE SHALL BE CHECKED FOR INFILTRATION BY FILLING WITH WATER TO THE TOP OF THE CONE SECTION. A STABILIZATION PERIOD OF ONE HOUR ALLOW FOR INFILTRATION. AT THE END OF THIS PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE. IF NECESSARY, AND THE MEASURING TIME OF AT LEAST SIX HOURS BEGUN. AT THE END OF THE TEST PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE MEASURING THE VOLUME OF WATER ADDED. THIS AMOUNT SHALL BE CONVERTED TO A 24 HOUR RATE AND THE LEAKAGE DETERMINED ON THE BASIS OF DEPTH. THE LEAKAGE FOR EACH MANHOLE SHALL NOT EXCEED ONE GALLON PER VERTICAL FOOT FOR A 24 HOUR PERIOD FOR EXFILTRATION. THERE SHALL BE NO VISIBLE INFILTRATION. IF AN AIR TEST IS PERFORMED ON THE MANHOLE, INSTEAD OF THE WATER TEST, THE MANHOLE SHALL REMAIN UN-BACKFILLED DOWN TO THE SEWER LINE INVERTS DURING THE AIR TEST.

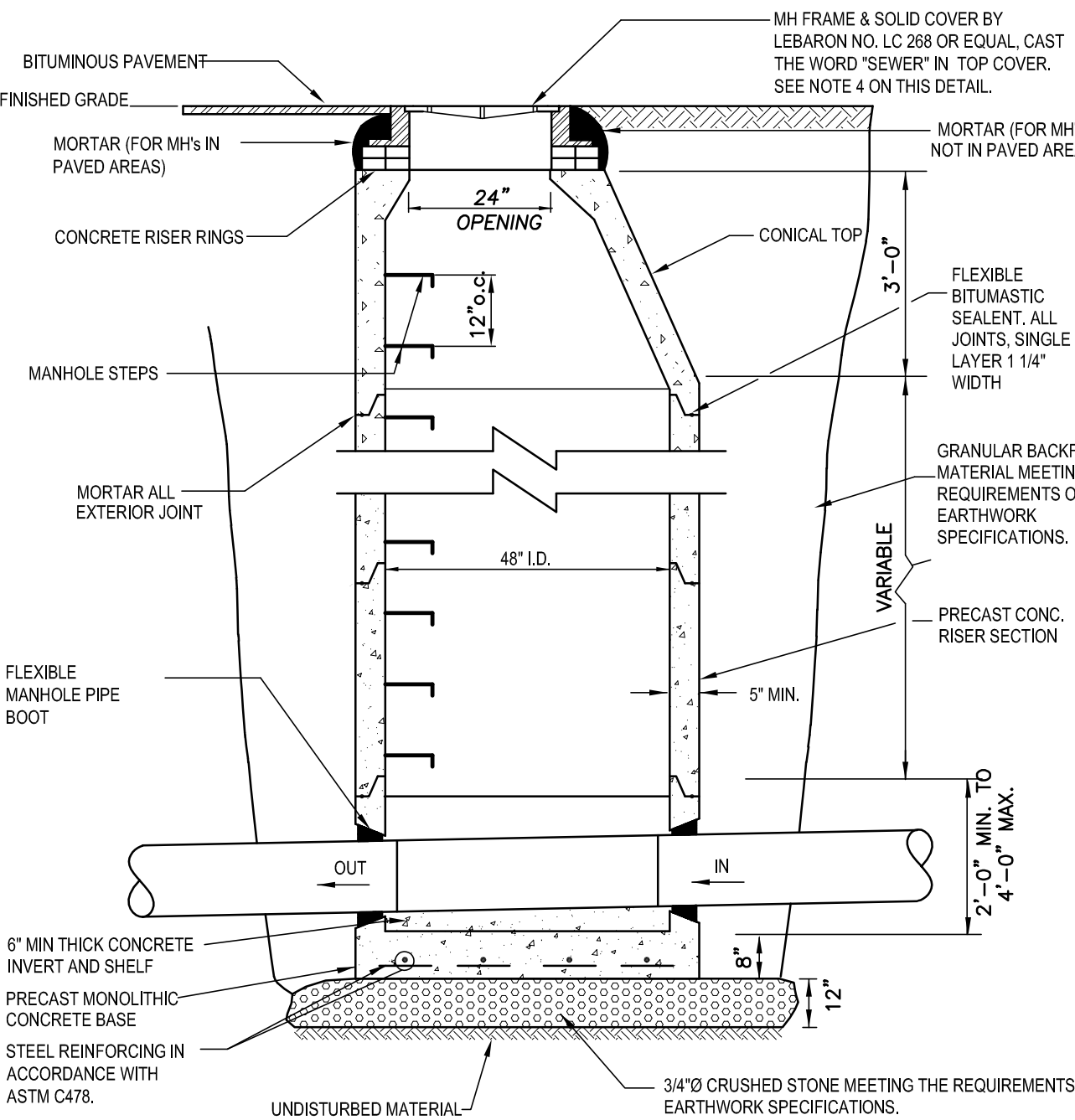
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|---------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <b>Design</b><br>Drive<br>Construction, UT 05403                          | <b>Construction Management</b><br>(802) 651-1283<br>www.construction-cm.com |
| <b>French Freeman, Architects</b><br>1000 Main Street<br>Durham, UT 05401 | <b>Consulting Architect</b><br>(802) 984-0854<br>www.rffcc.com              |
| <b>Structural Engineering</b><br>1000 Main Street<br>Durham, UT 05401     | <b>Structural Engineer</b><br>(802) 655-0755<br>www.hardys.com              |
| <b>ICS</b><br>1000 Main Street<br>Durham, UT 05403                        | <b>Mechanical Engineer</b><br>(802) 655-4891<br>www.hallam-ics.com          |
| <b>Planning Ventures P.A.</b><br>1000 Main Street<br>Durham, UT 05401     | <b>Civil Engineer</b><br>(802) 681-9225<br>www.engineeringventures.com      |
| <b>Design</b><br>1000 Main Street<br>Durham, UT 05403                     | <b>Geotechnical Engineer</b><br>(802) 652-5140<br>www.geodesign.net         |
| <b>Design</b><br>1000 Main Street<br>Durham, UT 05403                     | <b>Landscape Architect</b><br>(802) 962-0908<br>www.esrpa.com               |

SCALE: NONE



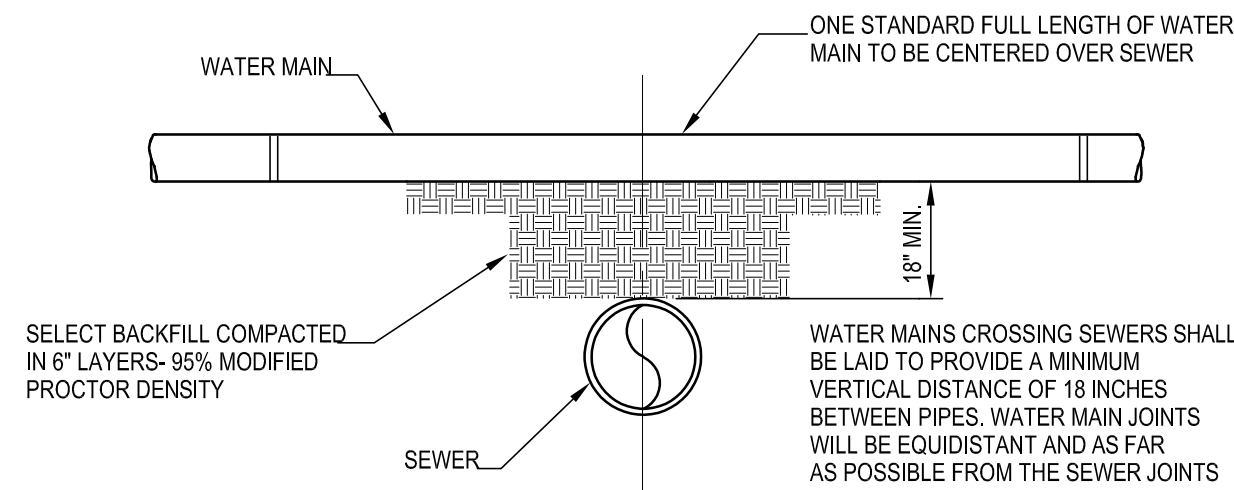
### SANITARY SEWER TRENCH NOTES

1. UNLESS OTHERWISE NOTED, ASSUME CLASS "C" SOILS. PERFORM ALL EXCAVATIONS TO OSHA REQUIREMENTS.
2. BEGINNING TO PROVIDE A FIRM, STABLE, CONTINUOUS AND UNIFORM SUPPORT FOR FULL LENGTH OF TRENCH.
3. IF THE TRENCH DEPTH IS 4 FEET TO MINIMUM DEPTH TO 12 FEET, SHIELDING OR SHIELDING BEAMS ARE TO BE INSTALLED AT A DEPTH LESS THAN 3'-0" UNDER DRIVEWAYS, EXTRA HEAVY CANTON IRON OR OTHER HIGH STRENGTH PIPE SHALL BE USED TO PROTECT UNDER DRIVEWAYS.
4. FOR SEWER COLLECTION SYSTEMS THE MINIMUM DEPTH TO TOP OF THE PIPE SHALL BE 5'-0". THIS DEPTH SHALL BE INCREASED TO 6'-0" IN AREAS TO BE FLOWED DURING THE WINTER MONTHS. OTHERWISE, REFER TO INSULATION OVER SHIELDING LINE DETAIL.
5. BACKFILL SHALL BE OF A SUITABLE MATERIAL REMOVED FROM EXCAVATION EXCEPT WHERE OTHER MATERIAL IS SPECIFIED. ALL LARGE ROCKS AND ALL OTHER LARGE MATERIAL, OR OTHER UNSUITABLE MATERIALS SHALL NOT BE USED FOR BACKFILL WITHIN TWO FEET OF THE TOP OF THE PIPE.
6. ALL EXCESSIVE SOIL AND ROCK STORES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF FOUR INCHES BELOW AND ON EACH SIDE OF ALL PIPES.



MANHOLE NOTES

1. PROVIDE SMOOTH SWEEPING TRANSITIONS BETWEEN INVERTS OF INTERSECTING PIPE.
2. IF DEPTH OF MANHOLE IS 7' OR LESS FROM RIM TO CENTERLINE INVERT, THEN A FLAT TOP WILL BE INSTALLED. IF DEPTH OF MANHOLE FROM RIM TO CENTERLINE INVERT IS MORE THAN 7 ft., THEN A CONICAL TOP WILL BE INSTALLED.
3. MANHOLE AND COVER SHALL BE DESIGNED FOR H2O LOADING.
4. INVERT TO BE FORMED AND POURED BY MANHOLE SUPPLIER UNLESS OTHERWISE APPROVED BY THE ENGINEER.

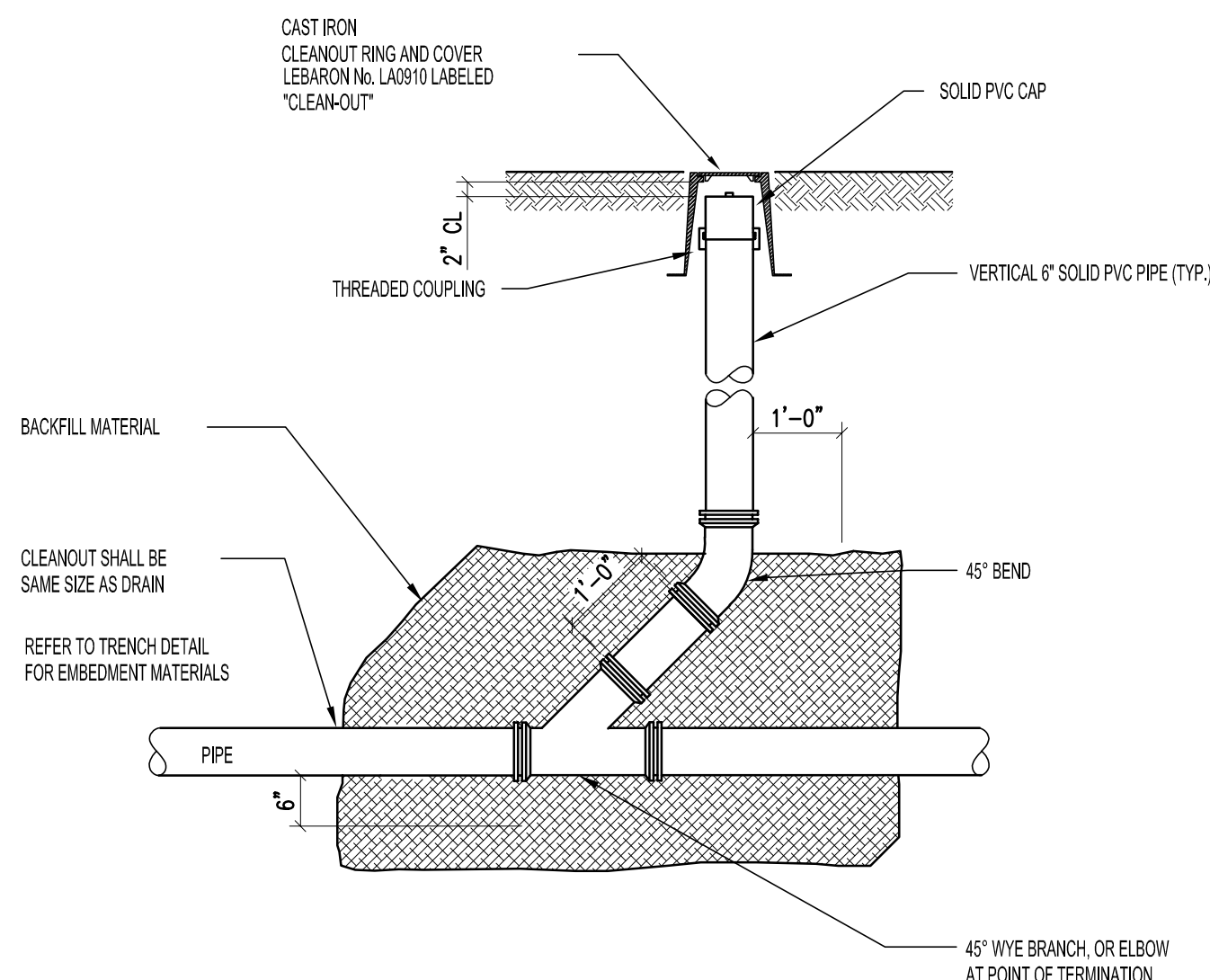
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### WATER MAIN ABOVE SEWER

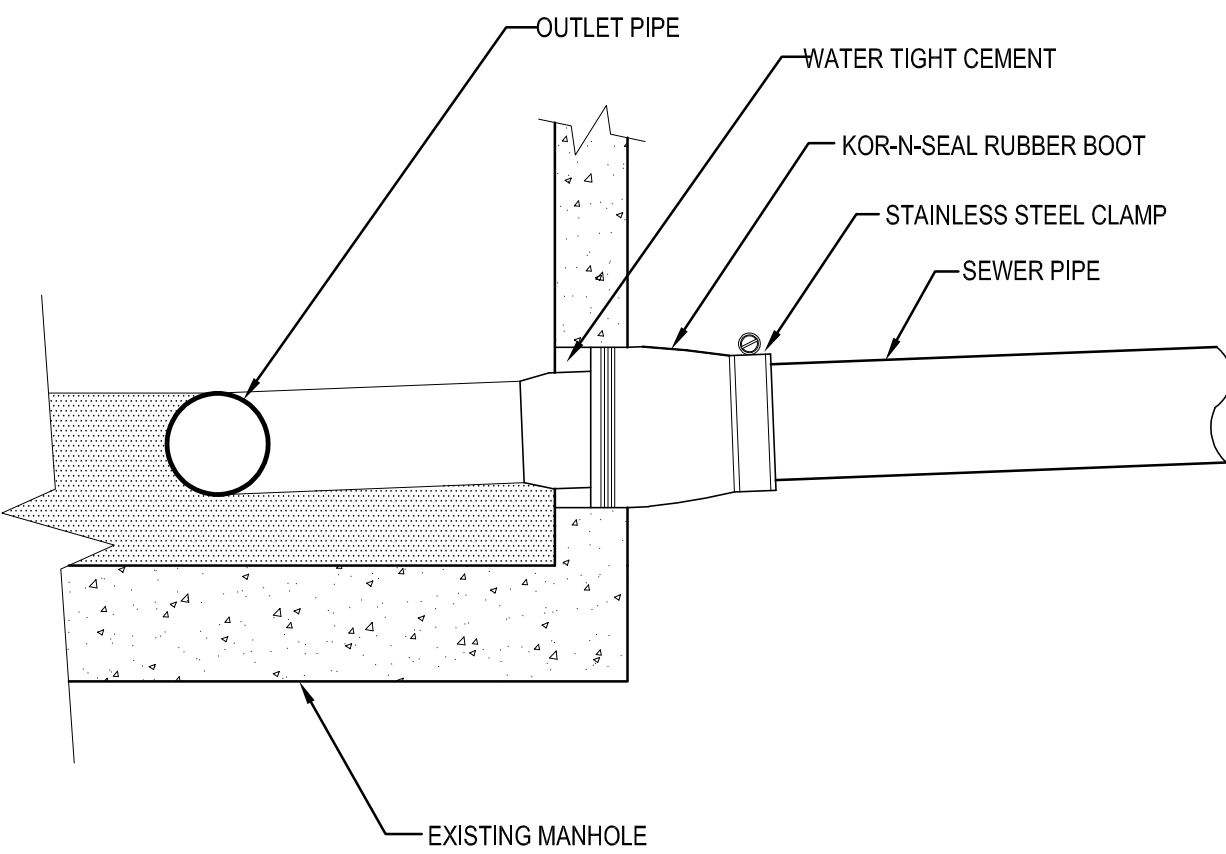
## SEPARATION NOTES

1. WATER MAIN RELATIONS TO SEWER SHALL BE IN ACCORDANCE WITH THE "RECOMMENDATIONS STANDARD FOR WATER WORKS" SO-CALLED TEN STATE STANDARDS.
2. WATER MAINS SHALL BE Laid AT LEAST 1' OFF HORIZONTALLY FROM ANY EXISTING OR PROPOSED SEWER MAINS. IF THE SEWER MAIN IS TO BE DEGRADED TO EDGE, IF THIS DISTANCE CANNOT BE OBTAINED, THEN THE PIPES SHALL BE INSTALLED IN A SEPARATE TRENCH AT AN ELEVATION SO THE BOTTOM OF THE WATER MAIN IS AT LEAST 18" INCHES ABOVE THE TOP OF THE SEWER.
3. WHEN IT IS IMPOSSIBLE TO MAINTAIN 18" VERTICAL SEPARATION OR WHERE THE SEWER MUST BE Laid 48" OR MORE BELOW THE WATER MAIN, THE SEWER MUST BE COVERED TO ONE FEET LENGTH OF SEWER IS CENTERED ABOVE OR BELOW THE WATER LINE WITH SEWER JOINTS AS FAR AS POSSIBLE FROM WATER JOINTS. 2" THE SEWER PIPE MUST BE CONSTRUCTED TO WATER MAIN DEPTH. THE SEWER PIPE SHALL BE COVERED WITH AT LEAST THREE (3) FEET OF THREE PIPE LENGTHS, WHICH EVER IS GREATER. 3" THE SECTION CONSTRUCTED TO WATER MAIN DEPTH MUST BE PRESURE TESTED TO FIFTY (50) PSF FOR 15 MINUTES TO PROVE THE SEWER JOINTS PROOF TO BACKFLOWS BEYOND ONE FOOT ABOVE THE PIPE TO ASSURE LEAK TIGHTNESS.

## SCALE: NONE (2)



SCALE: NONE



## KOR -N- SEAL NOTES

1. CORE HOLE SHALL BE SMOOTH, SYMMETRICAL, AND APPROPRIATELY SIZED FOR SEWER PIPE INSTALLATION.
2. RECONSTRUCT FLOW CHANNELS FOR NEW SEWER INLET PIPING.

SCALE: NONE

NOT FOR CONSTRUCTION

| Appendix   |     |                  |
|------------|-----|------------------|
| 12/15/2016 | 1   | P & Z Submission |
|            |     |                  |
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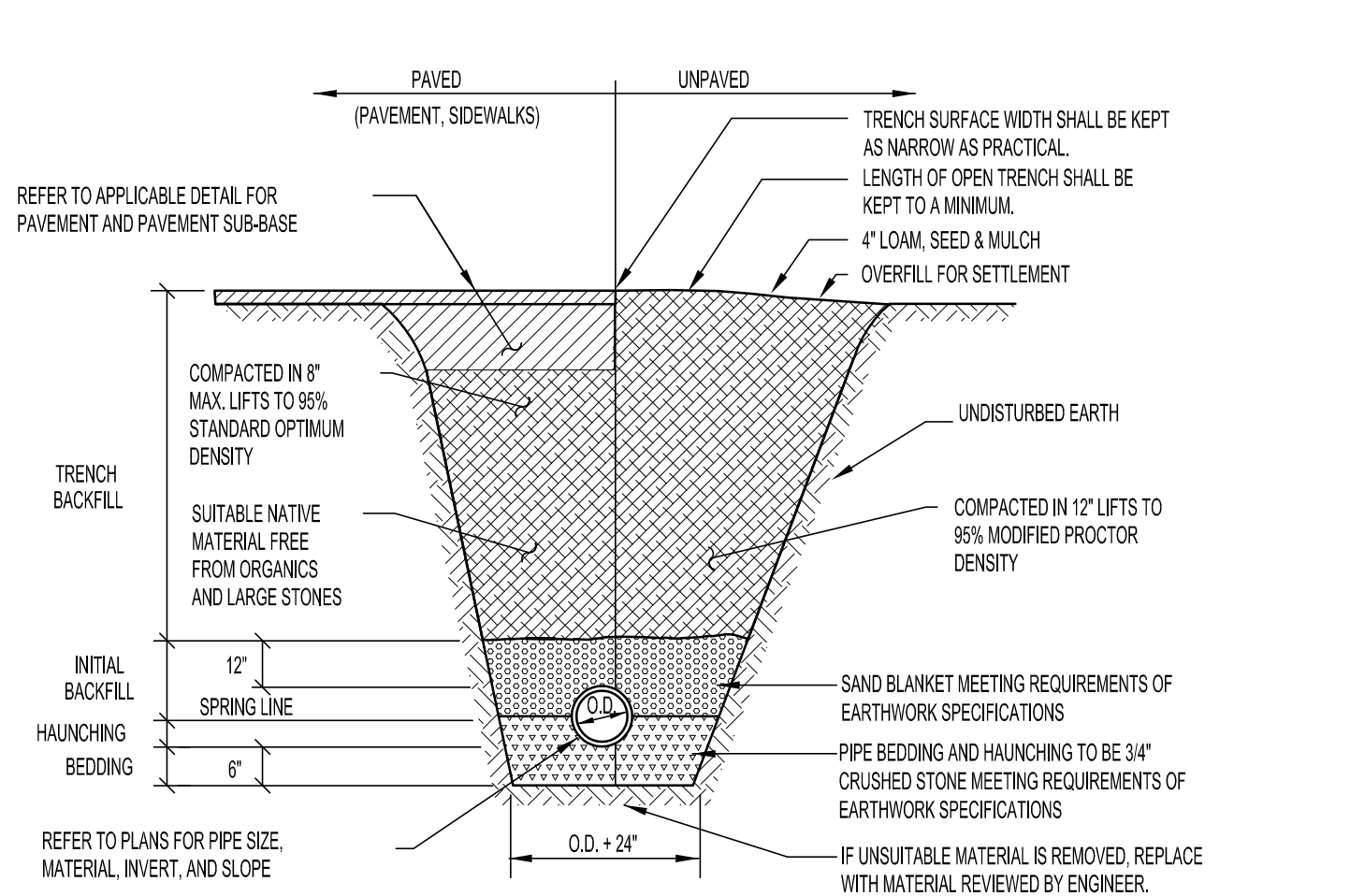
75 Cherry Street  
Burlington, VT 05401

|                 |                   |
|-----------------|-------------------|
| Project Number: | Signature & Seal: |
| 1317-01         |                   |
| Drawn By:       |                   |
| WC/JZ           |                   |
| Checked By:     |                   |
| JZ/KW           |                   |
| Scale:          |                   |
| As Noted        |                   |

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## C3.2



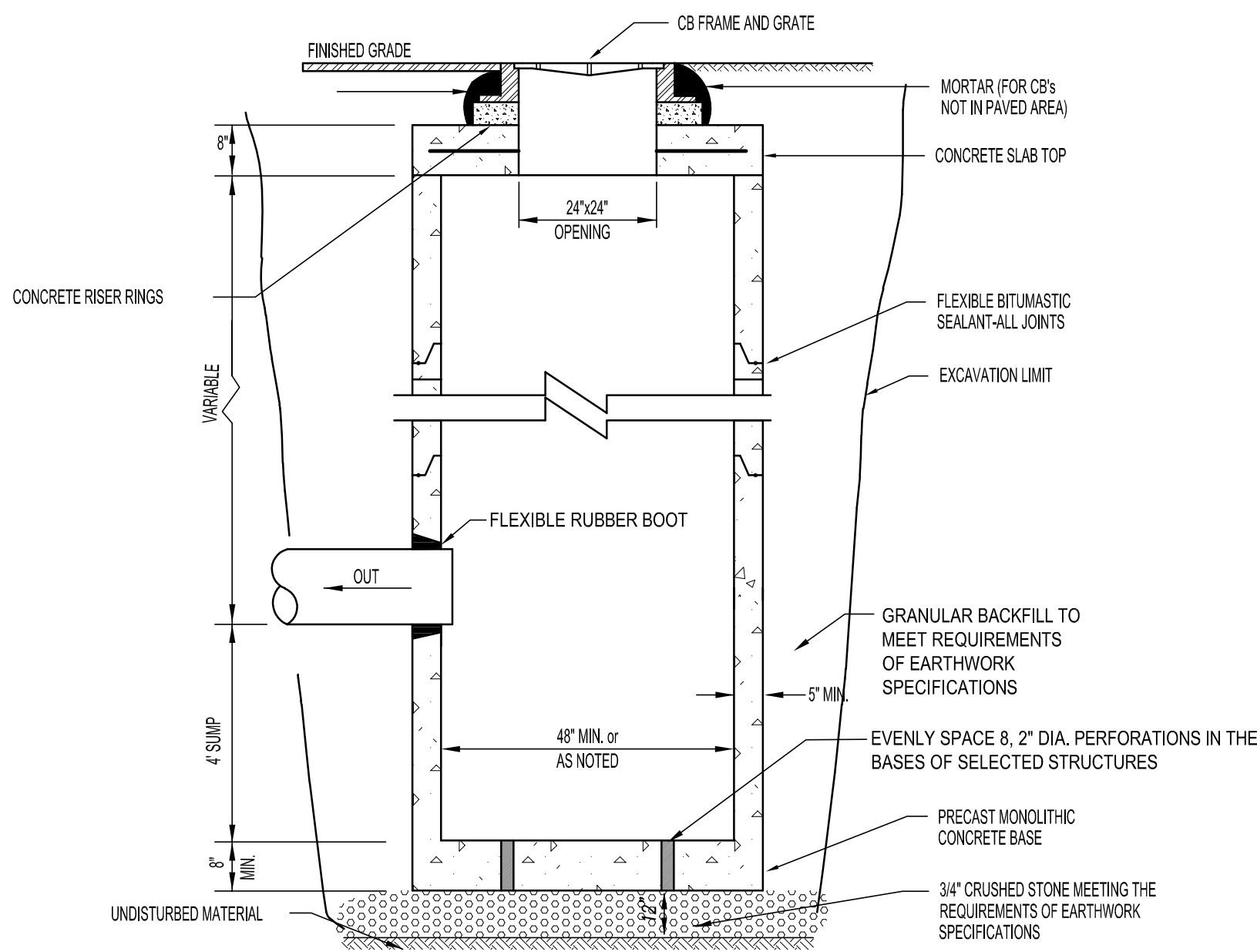


- STORM DRAIN TRENCH NOTES**
1. UNLESS OTHERWISE NOTED, ASSUME CLASS "C" SOILS. PERFORM ALL EXCAVATIONS TO OSHA REQUIREMENTS.
  2. BEDDING TO PROVIDE A FIRM, STABLE, CONTINUOUS AND UNIFORM SUPPORT FOR THE FULL LENGTH OF PIPE.
  3. WHEN APPLICABLE, INSTALL PIPE WITH BELL ENDS DOWN SLOPE. PREVENT SEDIMENT FROM ENTERING NEW STORM DRAIN SYSTEM DURING CONSTRUCTION.
  4. NO MECHANICAL TAMPERS SHALL BE USED DIRECTLY OVER PIPE TO INSURE PIPE IS NOT DAMAGED.
  5. PROVIDE 6" OF COVER OVER PIPE IN PAVED AREAS AND 5" OF COVER OVER PIPE IN UNPAVED AREAS. REFER TO INSULATION DETAIL FOR AREAS WHERE PROPER COVER CAN NOT BE ACHIEVED.

TYPICAL STORM DRAIN TRENCH DETAIL

SCALE: NONE

1

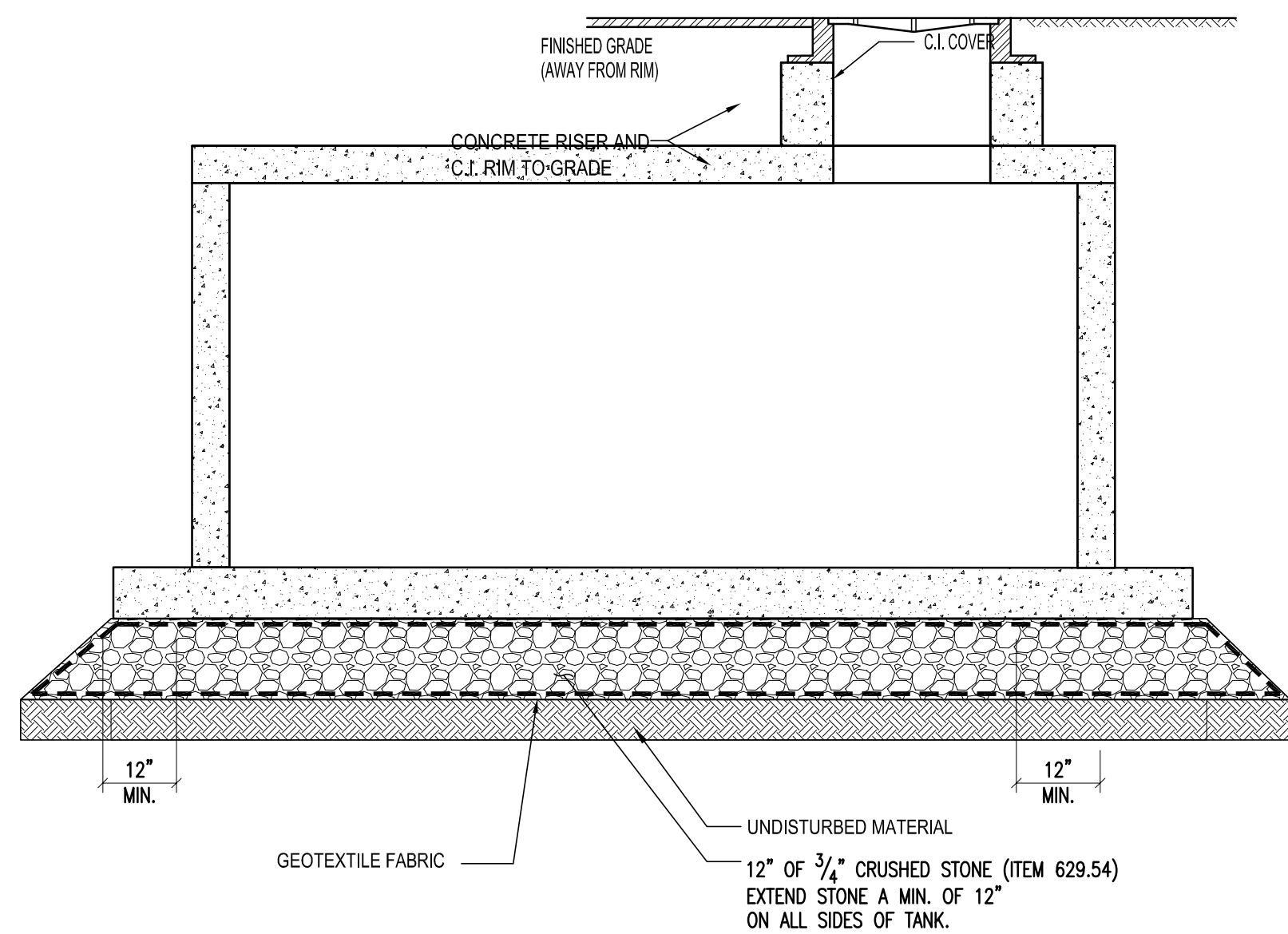


- CATCH BASIN NOTES**
1. PROVIDE A LEBARON 24"x24" TYPE E OR EQUAL, 3 FLANGE GRATE AND FRAME NEXT TO CURBS AND 4 FLANGE GRATE AND FRAME AT ALL OTHER LOCATIONS.
  2. CATCH BASIN AND GRATE SHALL BE DESIGNED FOR H20 LOADING.

CATCH BASIN DETAIL

SCALE: NONE

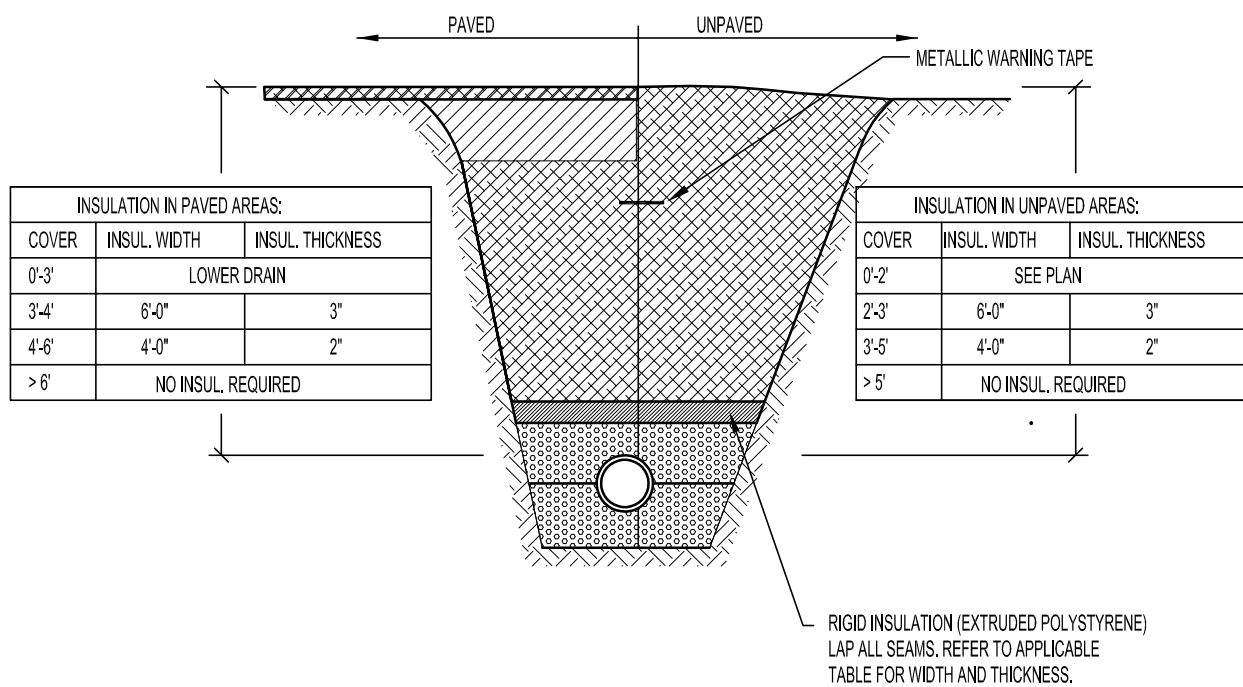
4



SECTION

- EMERGENCY STORAGE TANK NOTES:**
1. CAST IN PLACE TANK SHALL BE RATED FOR H20 LOADING.

STORM WATER STORAGE TANK DETAIL

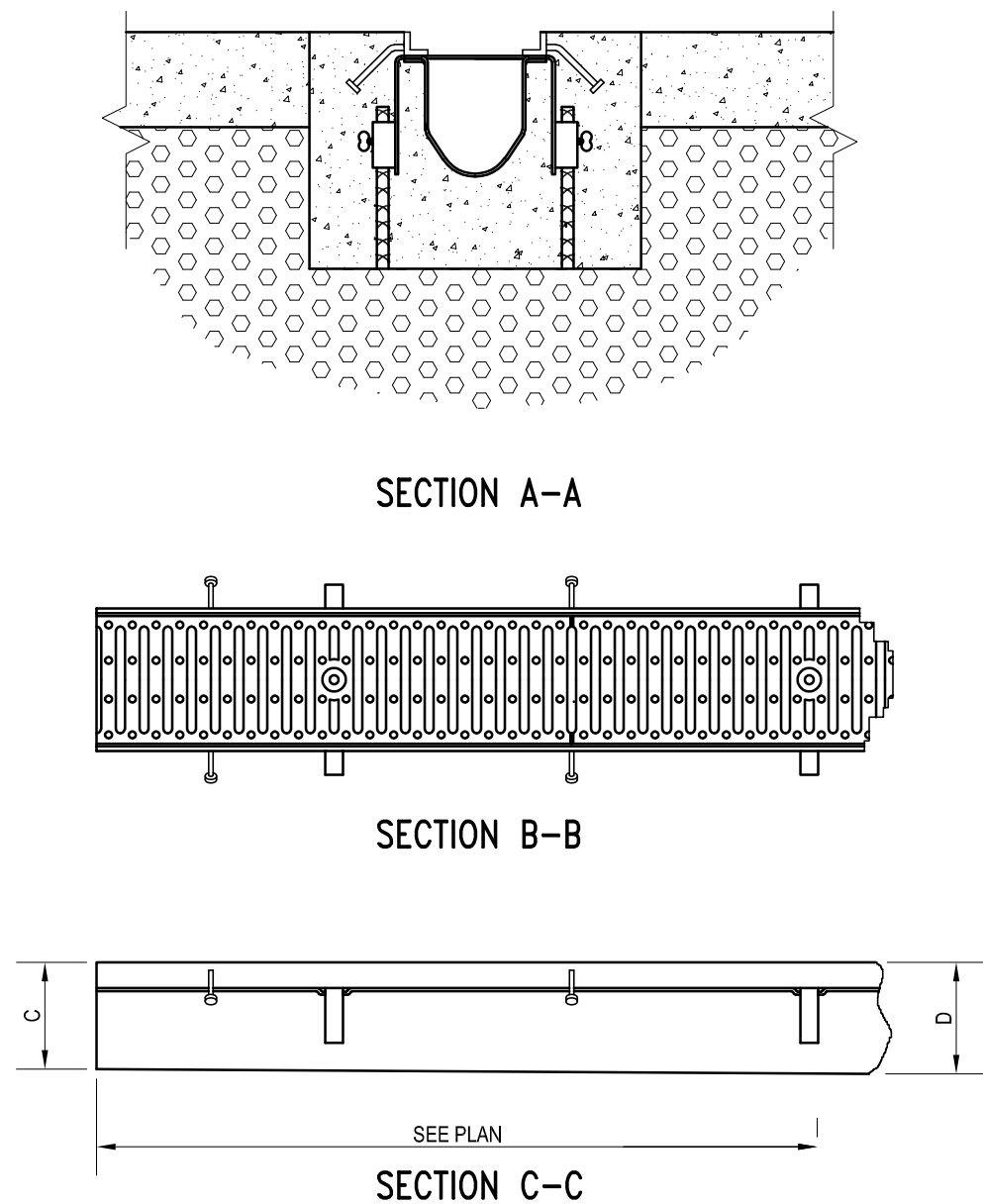


- TRENCH NOTES**
1. REFER TO APPLICABLE TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION.

INSULATION OVER SHALLOW DRAIN DETAIL

SCALE: NONE

2

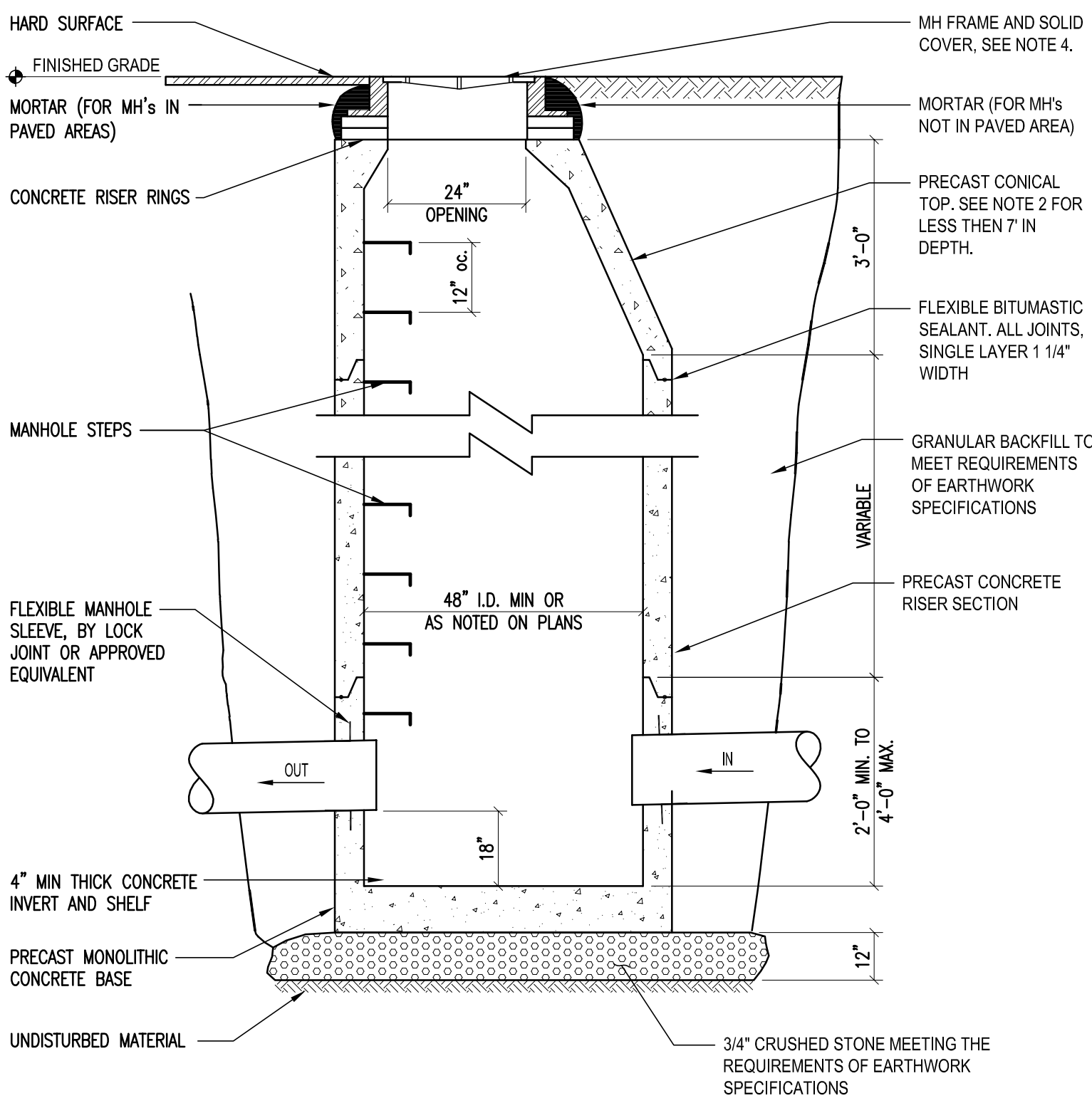


- NOTES:**
1. TRENCH DRAIN SHALL BE ACO MODEL #S100K, 9 SECTIONS, 6" WIDE TRENCH DRAIN SYSTEM OR APPROVED EQUIVALENT. PART NUMBERS SK22 THROUGH SK30.
  2. TRENCH FRAME AND GRATE SHALL BE HEAVY DUTY.
  3. TRENCH DRAIN SHALL BE CAST-IN-PLACE CONCRETE, INSTALLED PER MANUFACTURERS INSTRUCTIONS.
  4. CONCRETE TO BE 4000 PSI.
  5. TRENCH DRAIN SHALL BE CONNECTED THROUGH THE BOTTOM OF THE DRAIN AT THE INVERT SHOWN ON THE PLANS.

TRENCH DRAIN DETAIL

SCALE: NONE

5



- STORM MANHOLE NOTES**
1. PROVIDE SMOOTH SWEEPING TRANSITIONS BETWEEN INVERTS OF INTERSECTING PIPE.
  2. IF DEPTH OF MANHOLE IS 7 ft. OR LESS FROM RIM TO CENTERLINE INVERT, THEN A FLAT TOP WILL BE INSTALLED. IF DEPTH OF MANHOLE FROM RIM TO CENTERLINE INVERT IS MORE THAN 7 ft., THEN A CONICAL TOP WILL BE INSTALLED.
  3. MANHOLE AND COVER SHALL BE DESIGNED FOR H20 LOADING.
  4. PROVIDE A LEBARON NO. LC 288 OR APPROVED EQUIVALENT. CAST THE WORD "STORM" IN TOP COVER.
  5. MANHOLE SHALL BE PRECAST CONCRETE AS MANUFACTURED BY S.T. GRISWOLD & CO., INC. OR APPROVED EQUIVALENT.

STORM MANHOLE DETAIL

SCALE: NONE

3

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|            |     |                  |
|------------|-----|------------------|
| Approval   |     |                  |
| Project    |     |                  |
| 12/15/2016 | 1   | P & Z Submission |
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|            |     |                  |
| Date       | No. | Description      |

Burlington Town Center  
Devonwood Investors

75 Cherry Street  
Burlington, VT 05401

Drawing Title

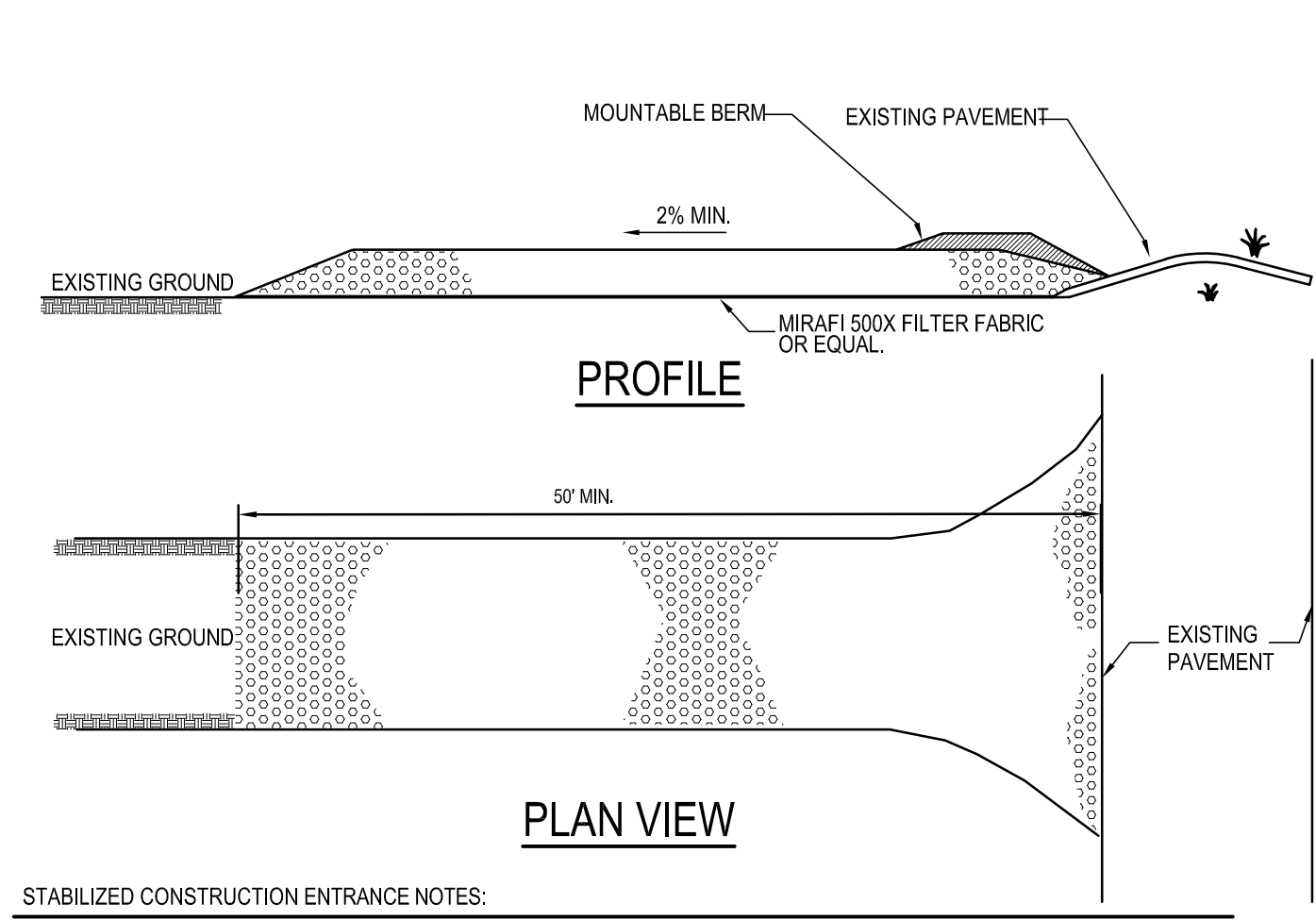
Storm Water  
Details

|                |                  |
|----------------|------------------|
| Project Number | Signature & Date |
| 1317-01        |                  |
| Drawn By       |                  |
| WCJZ           |                  |
| Checked By     |                  |
| JZ/KW          |                  |
| Scale          |                  |
| As Noted       |                  |
| Drawing Number |                  |

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12/15/16

C3.3

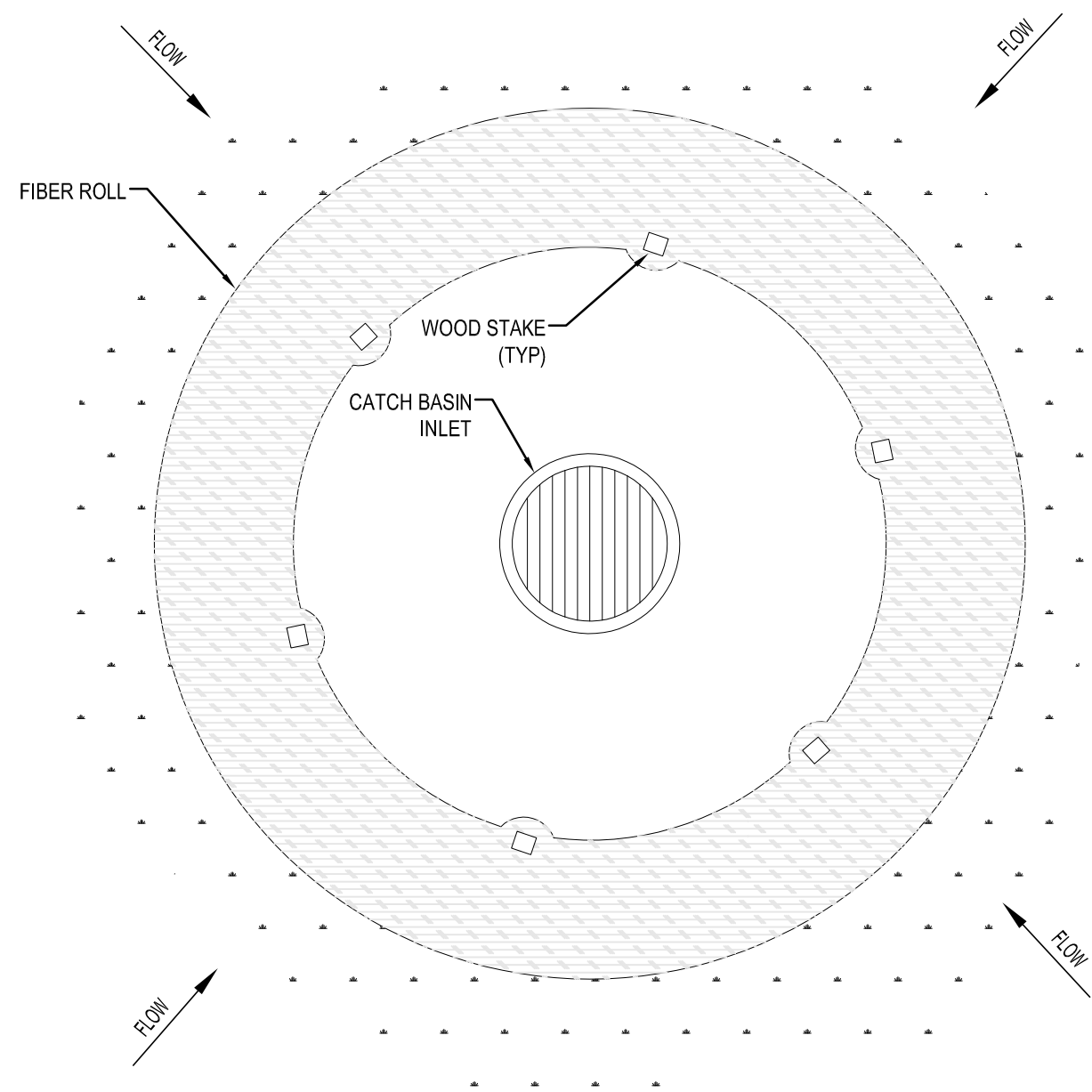




### CONSTRUCTION ENTRANCE DETAIL

SCALE: NONE

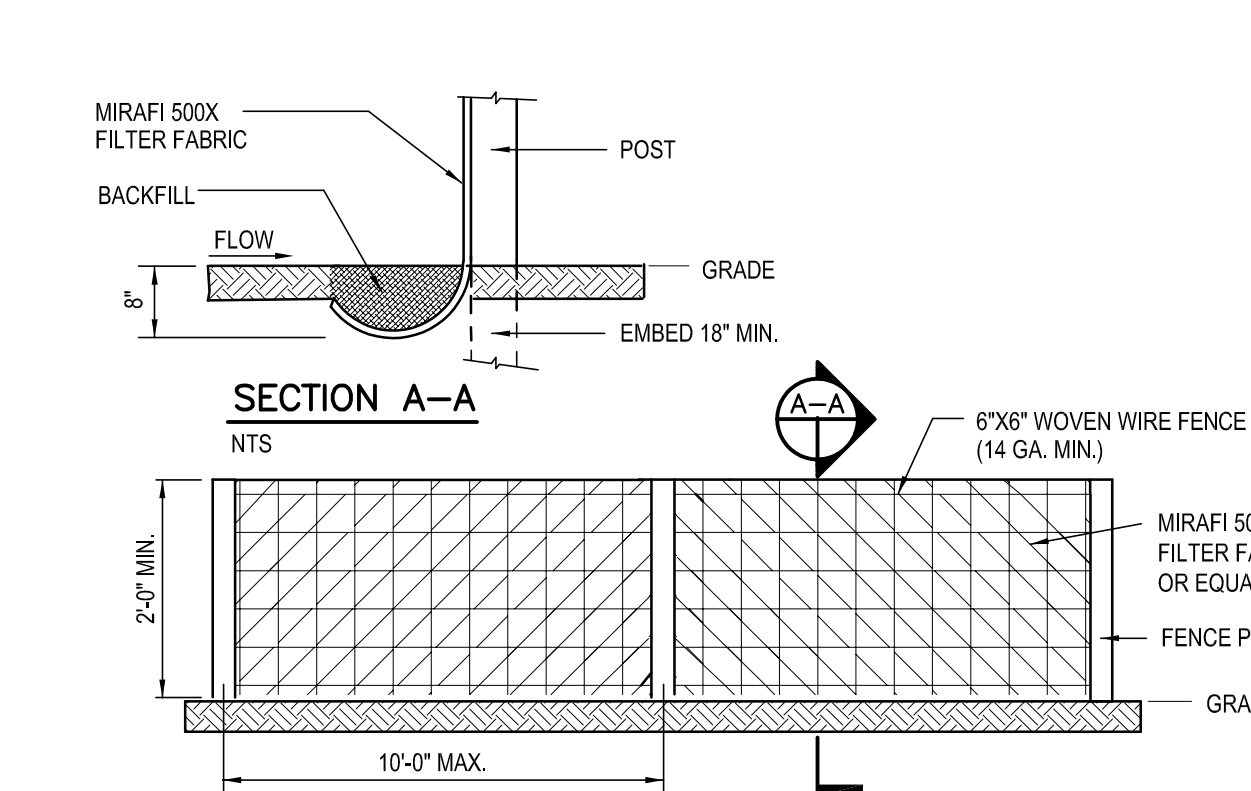
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### FIBER ROLL INLET PROTECTION DETAIL

SCALE: NONE

4

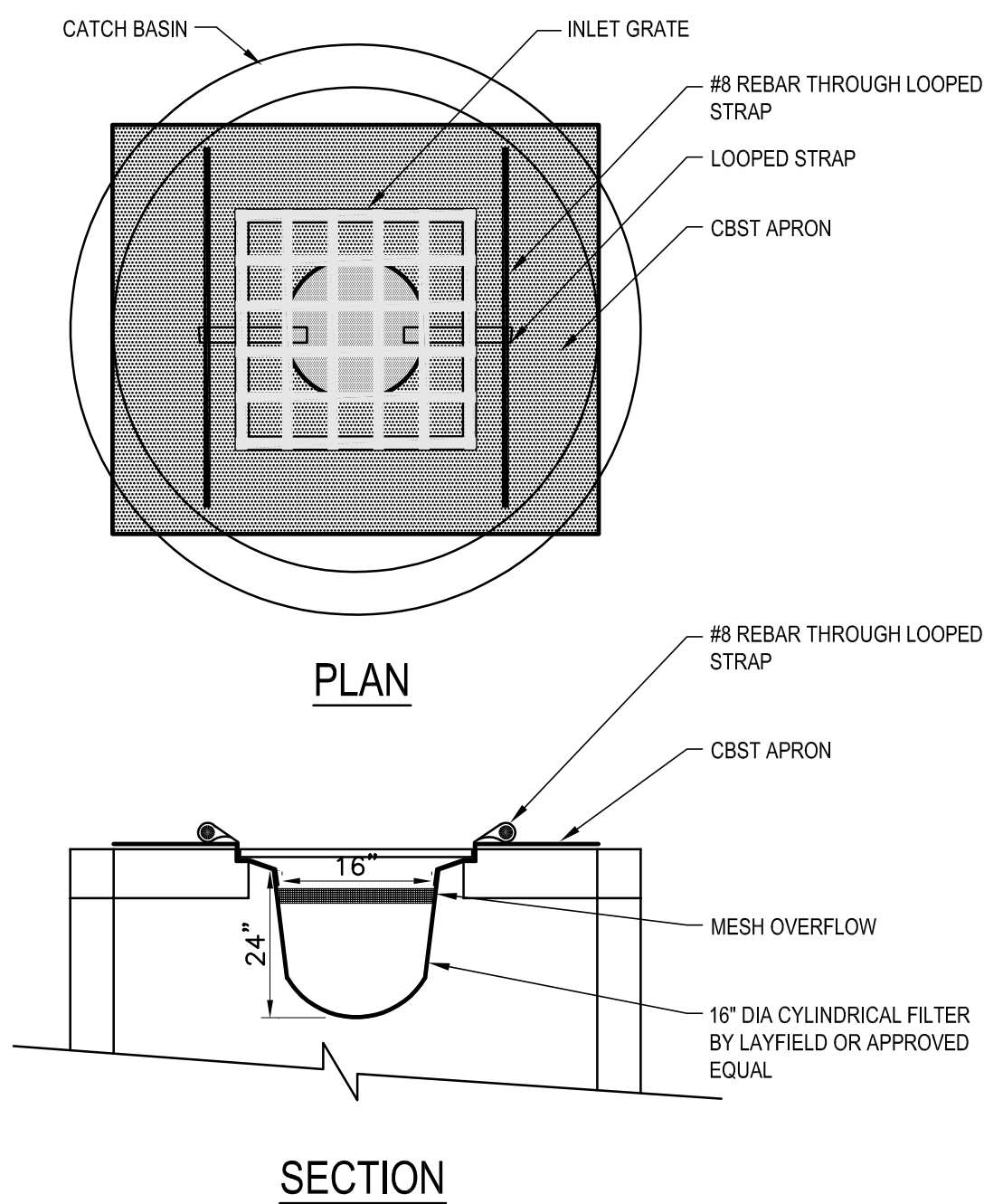


- SILT FENCE NOTES:**
- SILT FENCE SHALL BE PRE-FABRICATED EROSION CONTROL FENCE BY MIRAFI OR EQUAL, OR CONSTRUCTED IN PLACE AS SPECIFIED HEREIN.
  - CONSTRUCTED IN PLACE SILT FENCE:
    - WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
    - FILTER FABRIC TO BE FASTENED SECURELY TO WOVEN WIRE FENCE TIES SPACED EVERY 24\"/>
  - INSPECTION SHALL BE FREQUENT (MINIMUM ONCE A WEEK AND AFTER EVERY RAINFALL). MAINTENANCE SHALL BE PERFORMED AS NEEDED, AND SEDIMENT REMOVED WHEN BULKES DEVELOP IN SILT FENCE.
  - WOVEN WIRE FENCE REINFORCEMENT IS REQUIRED BY THE VT CONSTRUCTION GENERAL PERMIT WHEN SILT FENCE IS PLACED WITHIN 100 FEET UPSLOPE OF RECEIVING WATERS.

### SILT FENCE DETAIL

SCALE: NONE

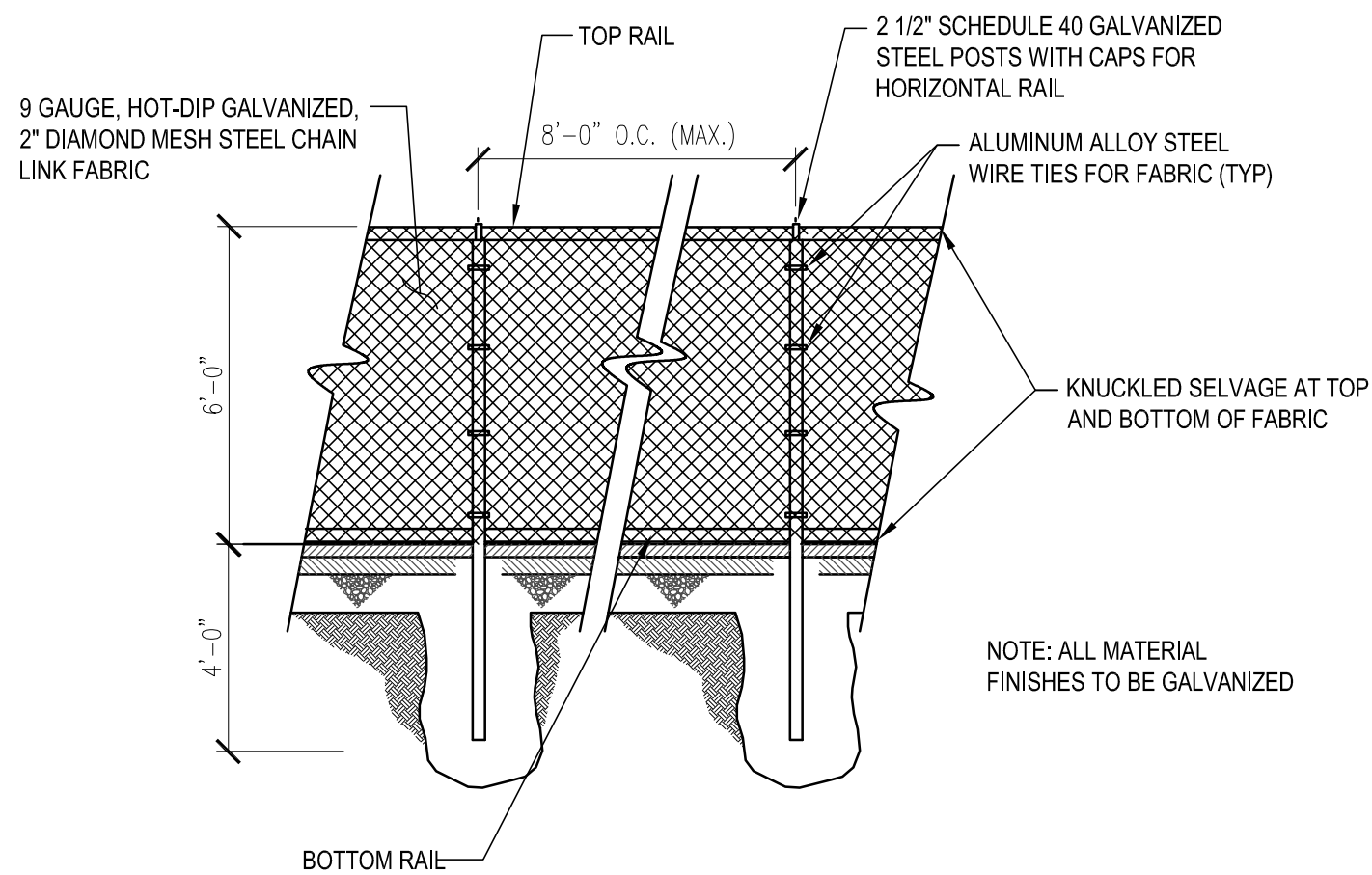
2



### FABRIC INLET PROTECTION

NOT TO SCALE

5



### FENCE DETAIL

SCALE: NONE

3

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| Date       | No. | Description      |
|------------|-----|------------------|
| 12/15/2016 | 1   | P & Z Submission |
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**Burlington Town Center**  
**Devonwood Investors**

75 Cherry Street  
Burlington, VT 05401

Drawing Title

### Erosion Prevention and Sediment Control Details

|                |          |                  |
|----------------|----------|------------------|
| Project Number | 1317-01  | Signature & Date |
| Drawn By       | WCJ/JZ   |                  |
| Checked By     | JZ/KW    |                  |
| Scale          | As Noted |                  |
| Drawing Number |          |                  |

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C3.4

Drawing





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www.hardysa.com

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www.hallam-ics.com

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Approval:

12/15/2016 01 P & Z SUBMISSION

Date No. Description

Project

Burlington Town Center

Devonwood Investors

75 Cherry Street  
Burlington, VT 05401

Layout Plan

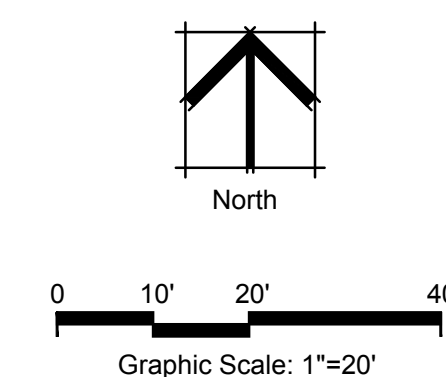
Project Number: 1317-01

Drawn By: mkw

Checked By: mkw

Date: 12/15/2016

Drawing Number: LA-200

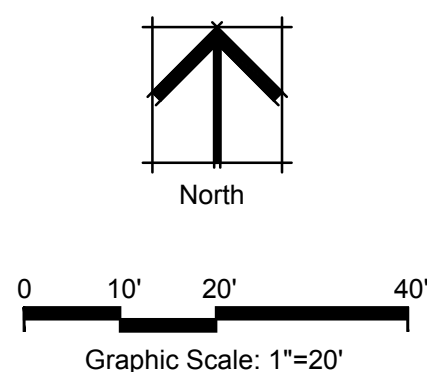






| KEY                                                                                         | BOTANICAL NAME                 | COMMON NAME            | QTY. | SIZE        | REMARKS                      | MATURE CANOPY DIMS.     |
|---------------------------------------------------------------------------------------------|--------------------------------|------------------------|------|-------------|------------------------------|-------------------------|
| DECIDUOUS TREES:                                                                            |                                |                        |      |             |                              |                         |
| AF                                                                                          | Acer rubrum 'Autumn flame'     | Autumn Flame Red Maple | 10   | 2.5-3" Cal. | B&B, 6' Branching Ht. (Min.) | 50' Tall x 30' Diameter |
| AR                                                                                          | Acer freemanii 'Sienna'        | Sienna Glen Red Maple  | 19   | 2.5-3" Cal. | B&B, 6' Branching Ht. (Min.) | 50' Tall x 30' Diameter |
| GB                                                                                          | Ginkgo biloba 'Autumn gold'    | Autumn Gold Ginkgo     | 22   | 2.5-3" Cal. | B&B, 6' Branching Ht. (Min.) | 50' Tall x 30' Diameter |
| UA                                                                                          | Ulmus americana 'Princeton'    | Princeton American Elm | 7    | 2.5-3" Cal. | B&B, 6' Branching Ht. (Min.) | 60' Tall x 40' Diameter |
| SHRUBS:                                                                                     |                                |                        |      |             |                              |                         |
| CS                                                                                          | Cornus sericea 'Isanti'        | Red-osier Dogwood      | 7    | 24-30" Wide | C.G., Plant 30" o.c.         |                         |
| IJ                                                                                          | Ilex verticillata 'Jim Dandy'  | Winterberry Holly      | 2    | 24-30" Wide | C.G., Plant 30" o.c.         |                         |
| IV                                                                                          | Ilex verticillata 'Red Sprite' | Winterberry Holly      | 10   | 24-30" Wide | C.G., Plant 30" o.c.         |                         |
| PERENNIALS:                                                                                 |                                |                        |      |             |                              |                         |
| Mixed variety of perennials and ornamental grasses used in the rain garden treatment areas. |                                |                        |      |             |                              |                         |

- NOTES:
1. CONTRACTOR IS RESPONSIBLE TO VERIFY ALL PLANT QUANTITIES FOUND IN THE PLANTING PLANS. IF ANY DISCREPANCIES ARE FOUND, LANDSCAPE ARCHITECT SHOULD BE NOTIFIED IMMEDIATELY.
  2. FINAL LAYOUT AND PLACEMENT OF ALL PLANT MATERIAL TO BE APPROVED BY THE LANDSCAPE ARCHITECT.
  3. REFER TO PLANTING DETAILS FOR PROPER PLANT MATERIAL INSTALLATION REQUIREMENTS.
  5. ALL TREE, SHRUB AND PERENNIAL PLANTING BEDS ARE TO BE CONTINUOUS, COMPLETELY DUG OUT AND BACKFILLED WITH THE PROPER PLANTING BED BACKFILL MATERIAL TO DEPTH SPECIFIED IN DETAILS AND SOIL PREPARATION SPECIFICATION.
  6. IF THE LANDSCAPE CONTRACTOR PROPOSES A SUBSTITUTE PLANT SPECIES, ALL SUBSTITUTES NEED TO BE APPROVED BY THE CITY ARBORIST AND LANDSCAPE ARCHITECT IN WRITING PRIOR TO ORDERING.
  7. FOR SOIL BACKFILL IN THE RAIN GARDEN BASINS, REFER TO CIVIL DRAWINGS, SPECIFICATIONS AND DETAILS.



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12/15/2016 01 P & Z SUBMISSION  
Date No. Description  
Project  
Burlington Town Center  
Devonwood Investors  
75 Cherry Street  
Burlington, VT 05401

Planting Plan

Project Number: 1317-01  
Drawn By: mkw  
Checked By: mkw  
Scale: 1"=20'  
Drawing Number:

LA-400





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Approved:

12/15/2016 01 P & Z SUBMISSION

Date No. Description

Burlington Town Center

Devonwood Investors

75 Cherry Street

Burlington, VT 05401

Lighting / Photometric Plan

Project Number: 1317-01

Drawn By: mkw

Checked By: mkw

Date: 12/15/2016

Scale: 1"=20'

Drawing Number: LA-500

Signature & Seal

1317-01

mkw

mkw

12/15/2016

1"=20'

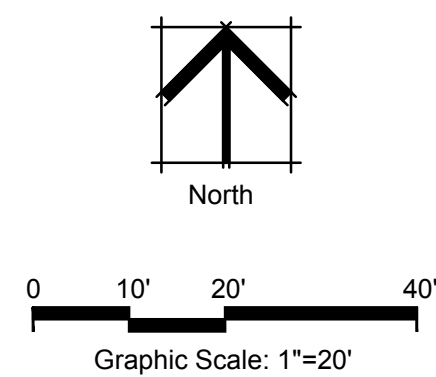
LA-500

Drawing

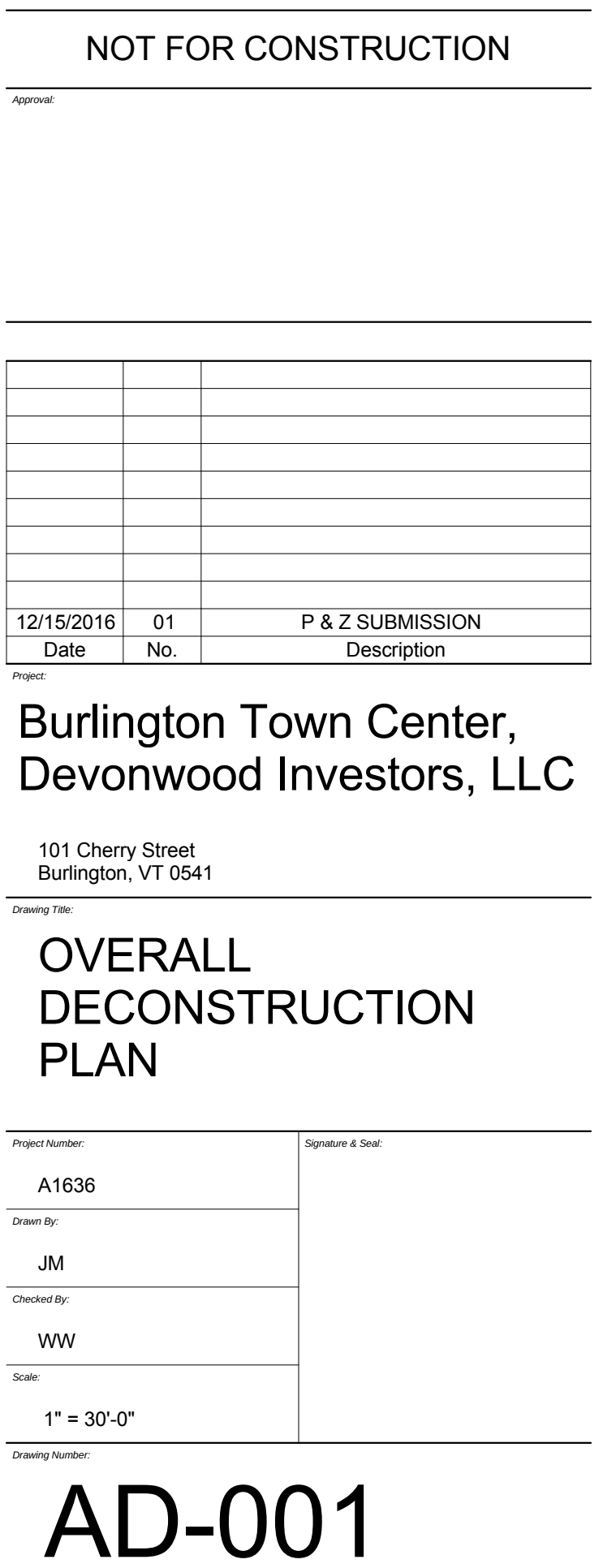
| FIXTURE AND POLE SPECIFICATIONS |                            |
|---------------------------------|----------------------------|
| Fixture A                       | Fixture B                  |
| Fixture Manufacturer: Lumec     | Fixture Manufacturer: Bega |
| Fixture: Domus - DMS50          | Fixture: 66698             |
| Configuration: 1A               | Lamp: 18w LED              |
| Lamp: 90Watt LED4K              | Color: Black               |
| Lens Type: Flat Glass           | Mounting Height: 7 feet    |
| Distribution: LE3F              |                            |
| Color: Black                    |                            |
| Pole Manufacturer: Lumec        |                            |
| Pole: SPR5V-25.5'               |                            |
| Pole Options: B105 & GFI        |                            |
| Mounting Arm: SM-1A, LMS*       |                            |
| Color: Black                    |                            |

Notes:  
1. Proposed street lights to match BED lighting standards for street lights within the Central Business District.

\* - LMS radius must measure 5' distance from center of pole to center of fixture. City of Burlington standard.

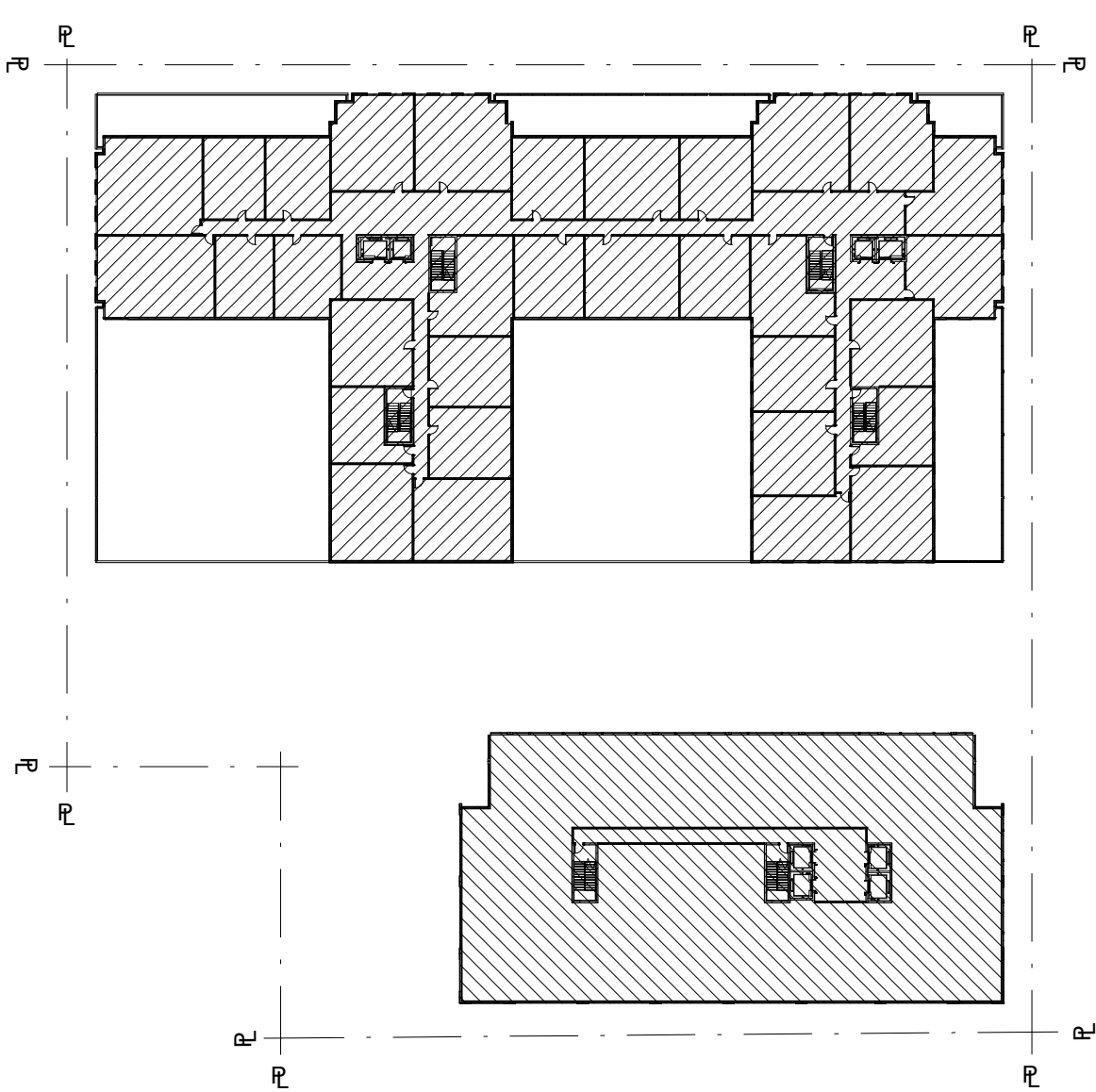






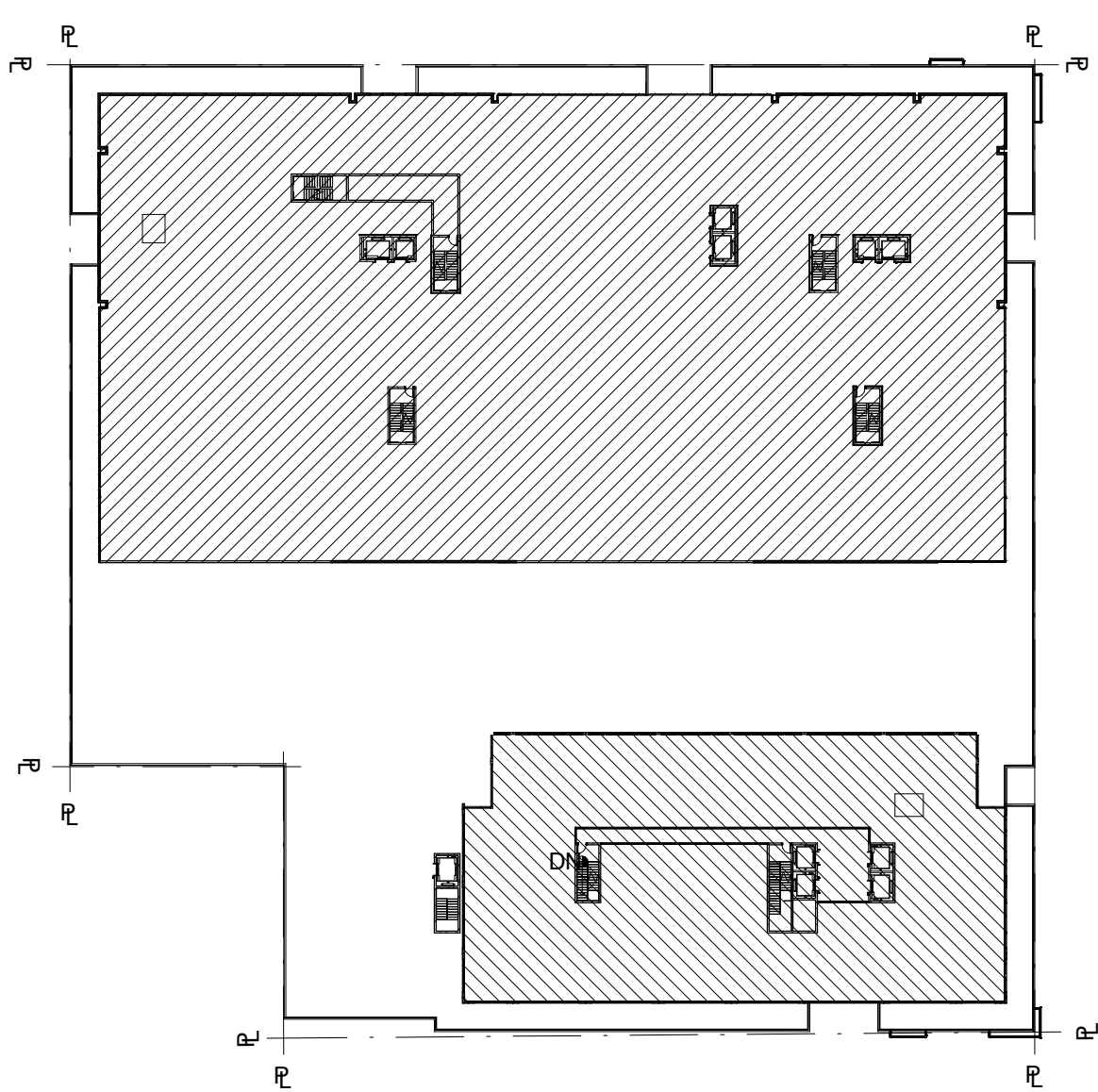


| 8TH FLOOR NORTH & 9TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 8TH   | 33,788.72 SF | 30.78 %  |
| SOUTH                                      | 9TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 51,657.30 SF | 47.06 %  |



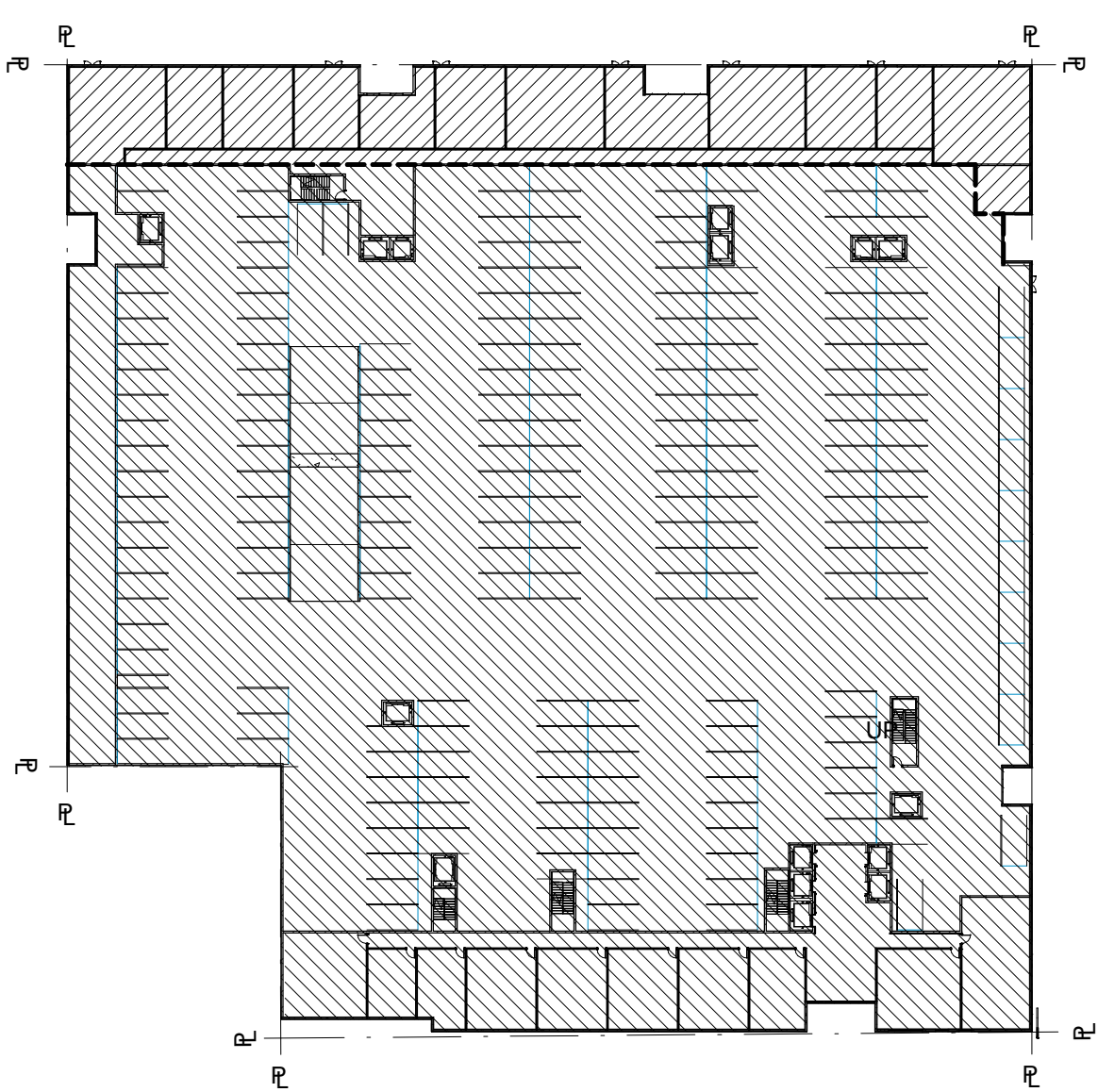
9 LOT COVERAGE - 8TH FLOOR NT  
& 9TH FLOOR ST  
1/64" = 1'-0"

| 5TH FLOOR NORTH & 6TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 5TH   | 53,281.74 SF | 48.54 %  |
| SOUTH                                      | 6TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 71,150.32 SF | 64.82 %  |



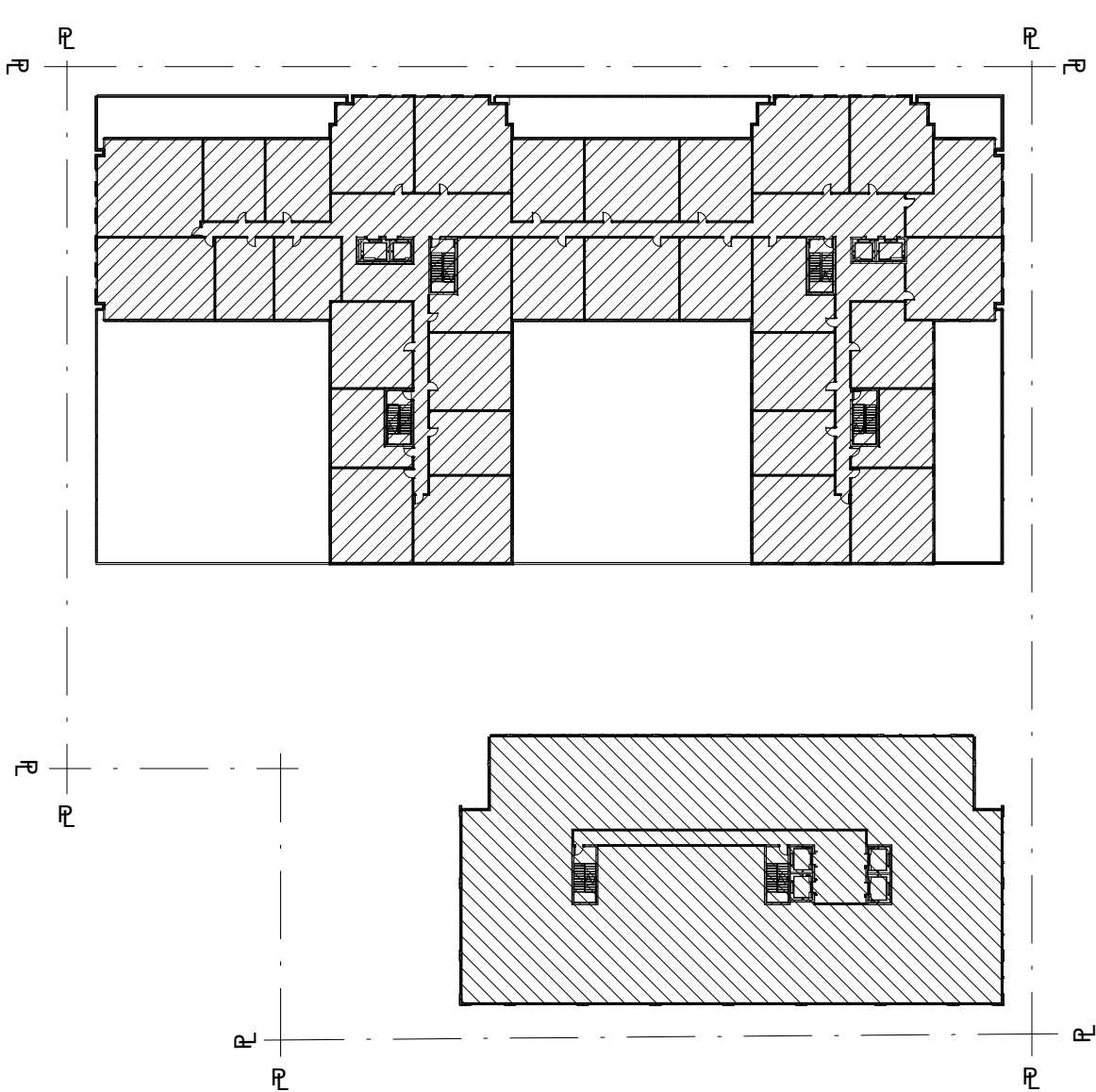
6 LOT COVERAGE - 5TH FLOOR NT  
& 6TH FLOOR ST  
1/64" = 1'-0"

| 2ND FLOOR NORTH & 3RD FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 2ND   | 11,987.02 SF  | 10.92 %  |
| SOUTH                                      | 3RD   | 95,942.43 SF  | 87.40 %  |
| TOTAL                                      |       | 107,929.45 SF | 98.32 %  |



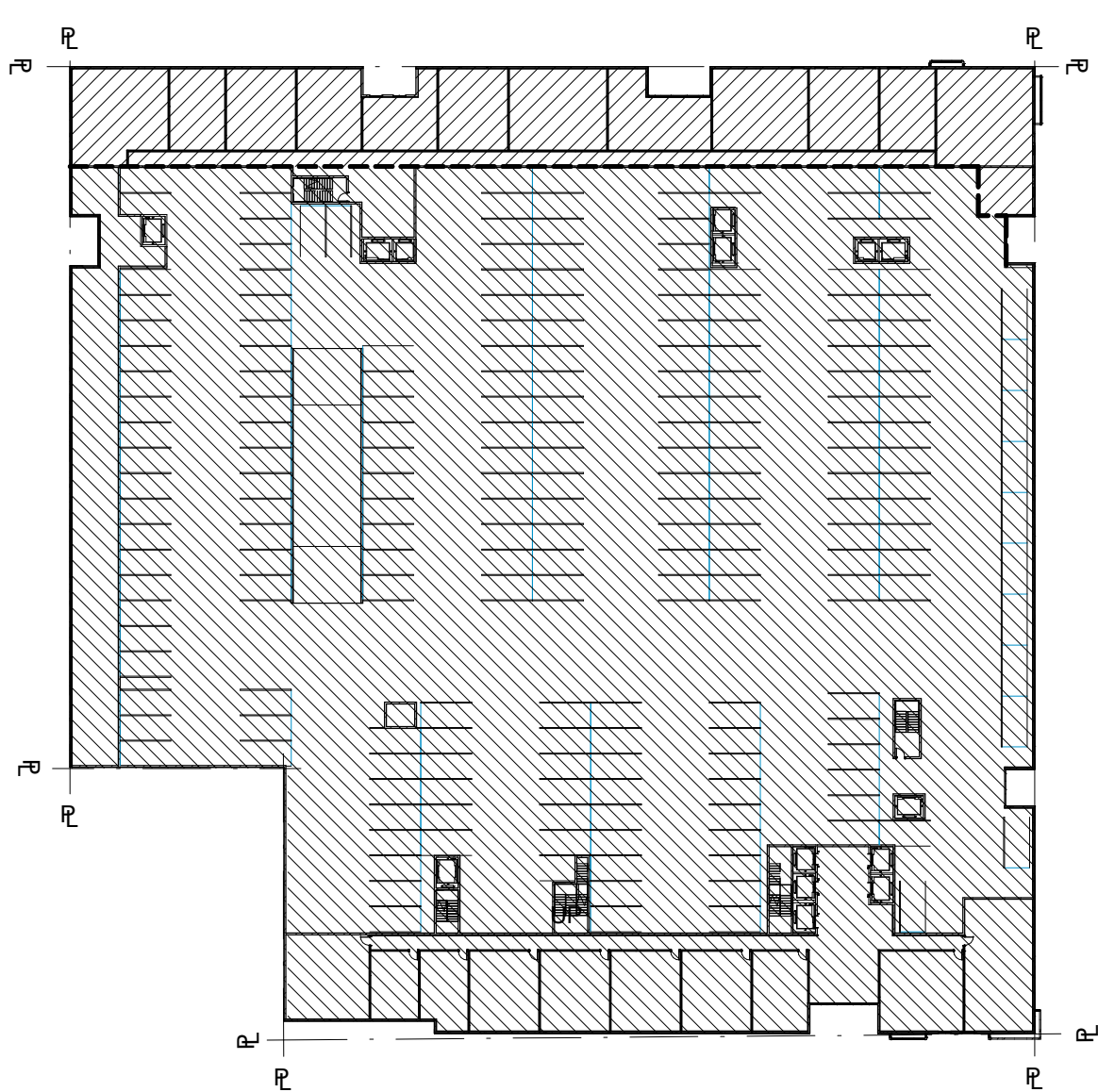
3 LOT COVERAGE - 2ND FLOOR NT  
& 3RD FLOOR ST  
1/64" = 1'-0"

| 7TH FLOOR NORTH & 8TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 7TH   | 33,788.72 SF | 30.78 %  |
| SOUTH                                      | 8TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 51,657.30 SF | 47.06 %  |



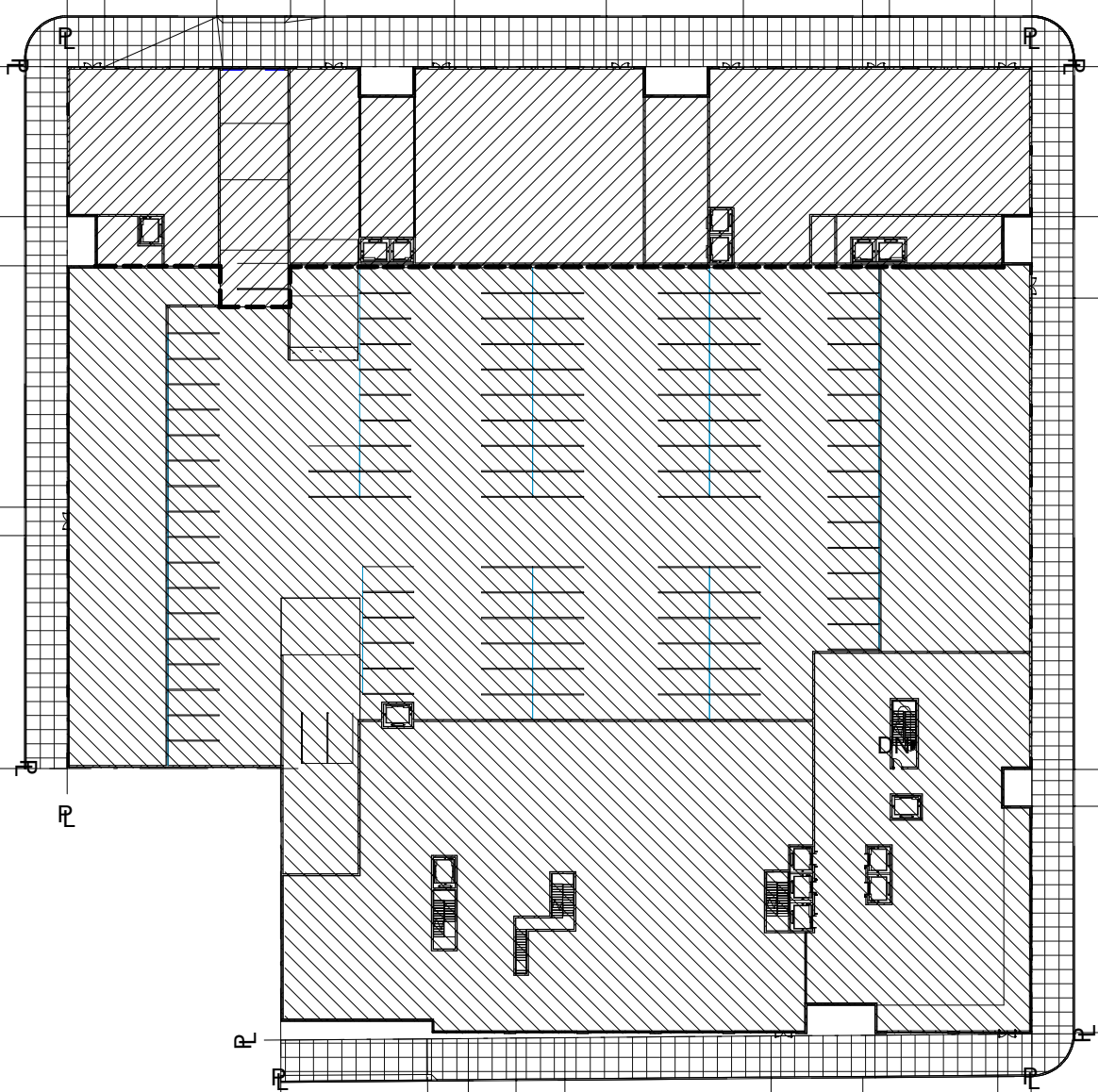
8 LOT COVERAGE - 7TH FLOOR NT  
& 8TH FLOOR ST  
1/64" = 1'-0"

| 4TH FLOOR NORTH & 5TH FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 4TH   | 11,987.02 SF  | 10.92 %  |
| SOUTH                                      | 5TH   | 95,942.43 SF  | 87.40 %  |
| TOTAL                                      |       | 108,116.12 SF | 98.32 %  |



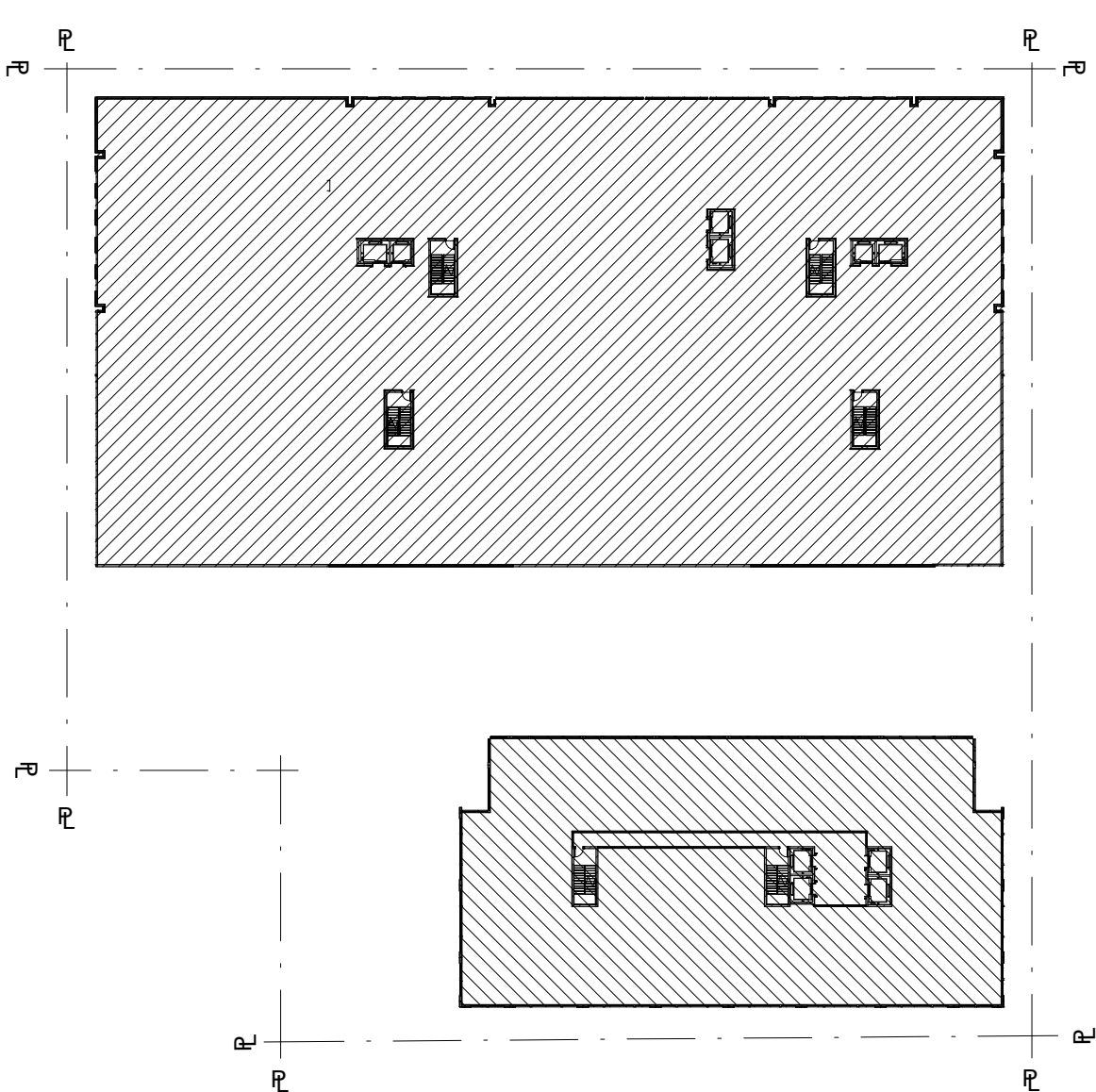
5 LOT COVERAGE - 4TH FLOOR NT  
& 5TH FLOOR ST  
1/64" = 1'-0"

| 1ST FLOOR NORTH & 2ND FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 1ST   | 23,682.33 SF  | 21.57 %  |
| SOUTH                                      | 2ND   | 84,233.53 SF  | 76.73 %  |
| TOTAL                                      |       | 107,915.86 SF | 98.30 %  |



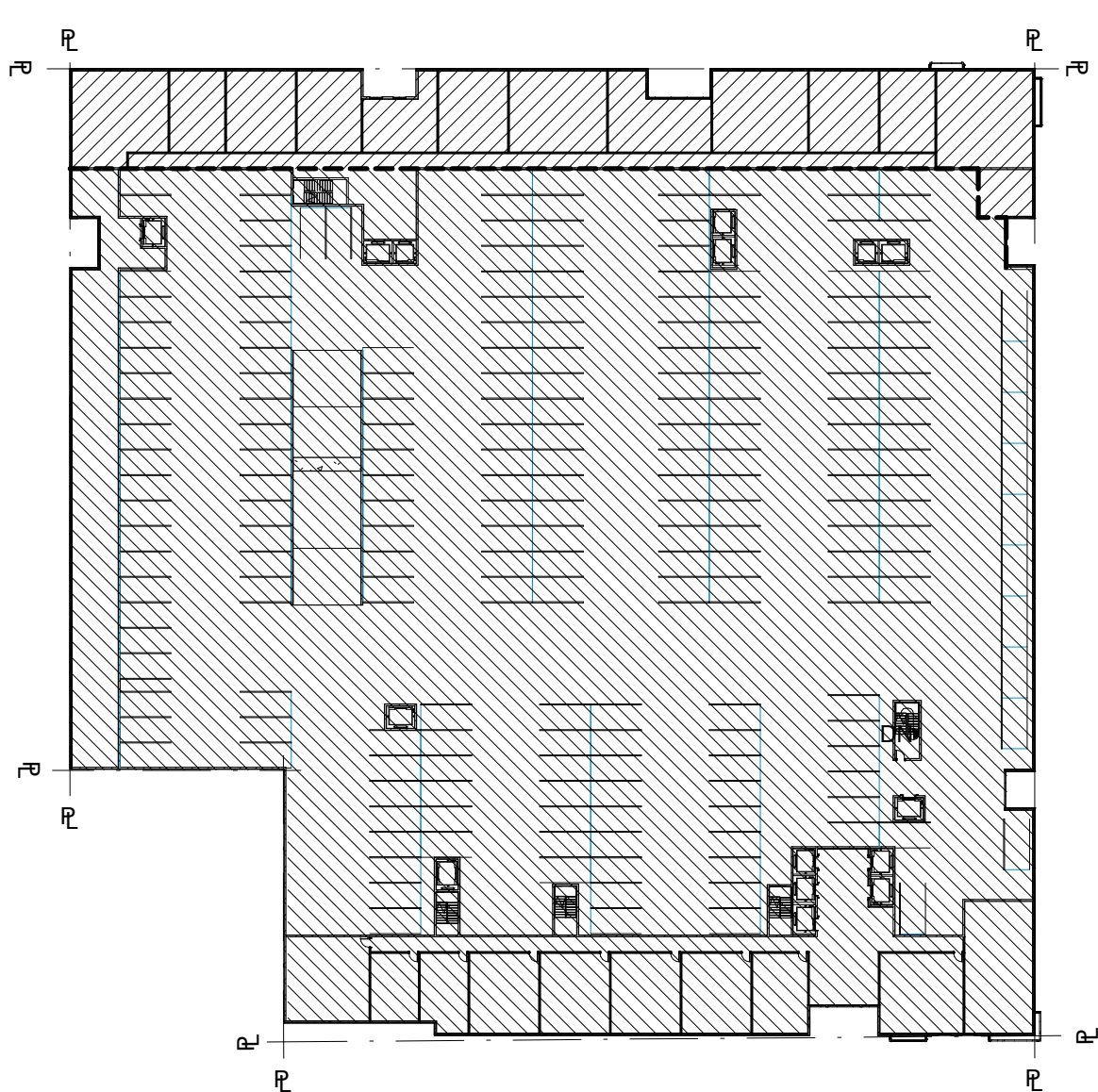
2 LOT COVERAGE - 1ST FLOOR NT  
& 2ND FLOOR ST  
1/64" = 1'-0"

| 6TH FLOOR NORTH & 7TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 6TH   | 53,281.74 SF | 48.54 %  |
| SOUTH                                      | 7TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 71,150.32 SF | 64.82 %  |



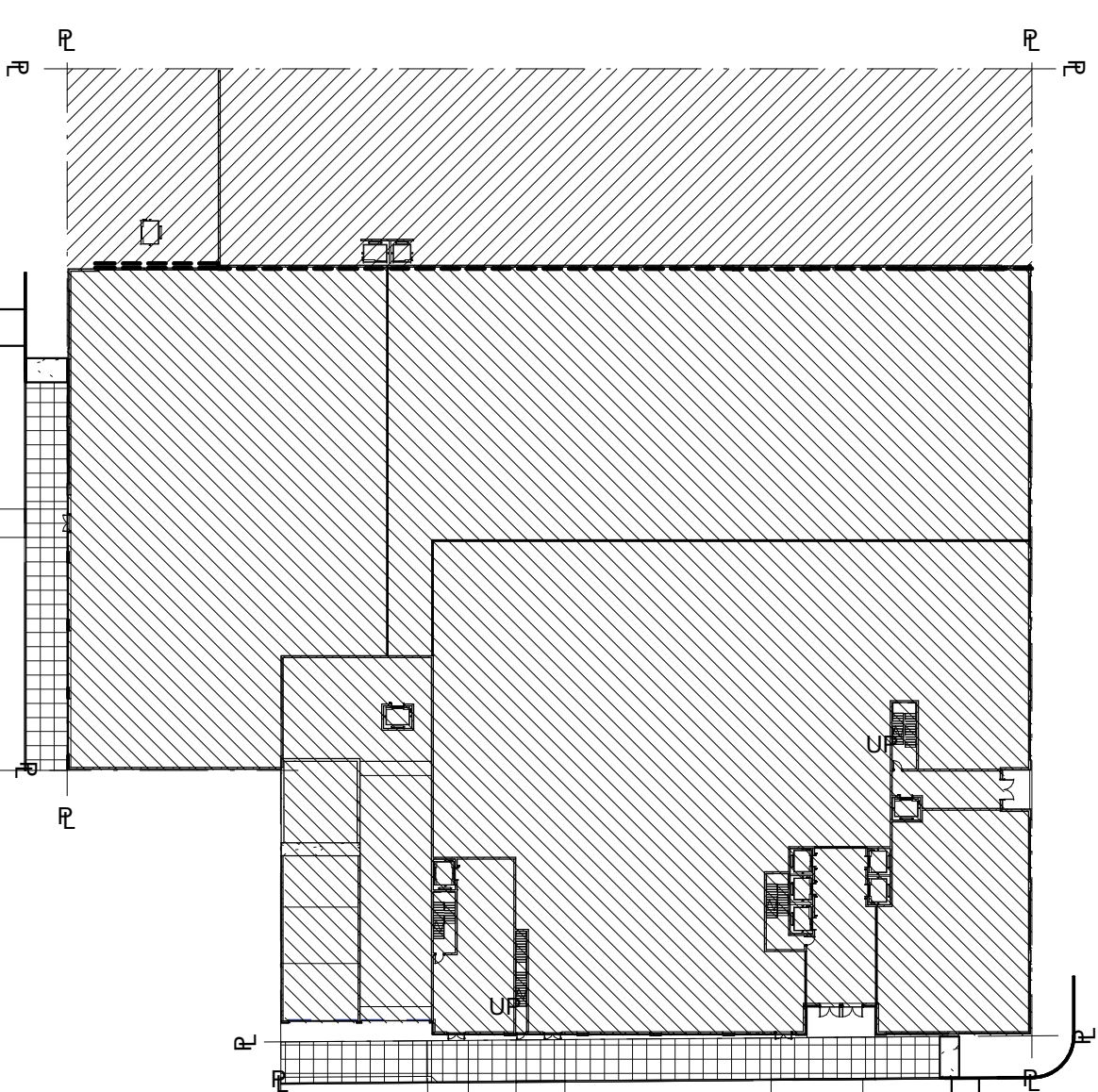
7 LOT COVERAGE - 6TH FLOOR NT  
& 7TH FLOOR ST  
1/64" = 1'-0"

| 3RD FLOOR NORTH & 4TH FLOOR SOUTH COVERAGE |       |               |          |
|--------------------------------------------|-------|---------------|----------|
| PORTION                                    | FLOOR | AREA          | COVERAGE |
| NORTH                                      | 3RD   | 11,987.02 SF  | 10.92 %  |
| SOUTH                                      | 4TH   | 95,942.43 SF  | 87.40 %  |
| TOTAL                                      |       | 107,929.45 SF | 98.32 %  |



4 LOT COVERAGE - 3RD FLOOR NT  
& 4TH FLOOR ST  
1/64" = 1'-0"

| 1ST FLOOR SOUTH COVERAGE |        |              |          |
|--------------------------|--------|--------------|----------|
| PORTION                  | FLOOR  | AREA         | COVERAGE |
| NORTH                    | CELLAR | 24,026.29 SF | 00.00 %  |
| SOUTH                    | 1ST    | 84,582.32 SF | 77.05 %  |
| TOTAL                    |        | 84,582.32 SF | 77.05 %  |



1 LOT COVERAGE - 1ST FLOOR ST  
1/64" = 1'-0"

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Approval

Project

12/15/16 P&Z Submission

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Date No. Description

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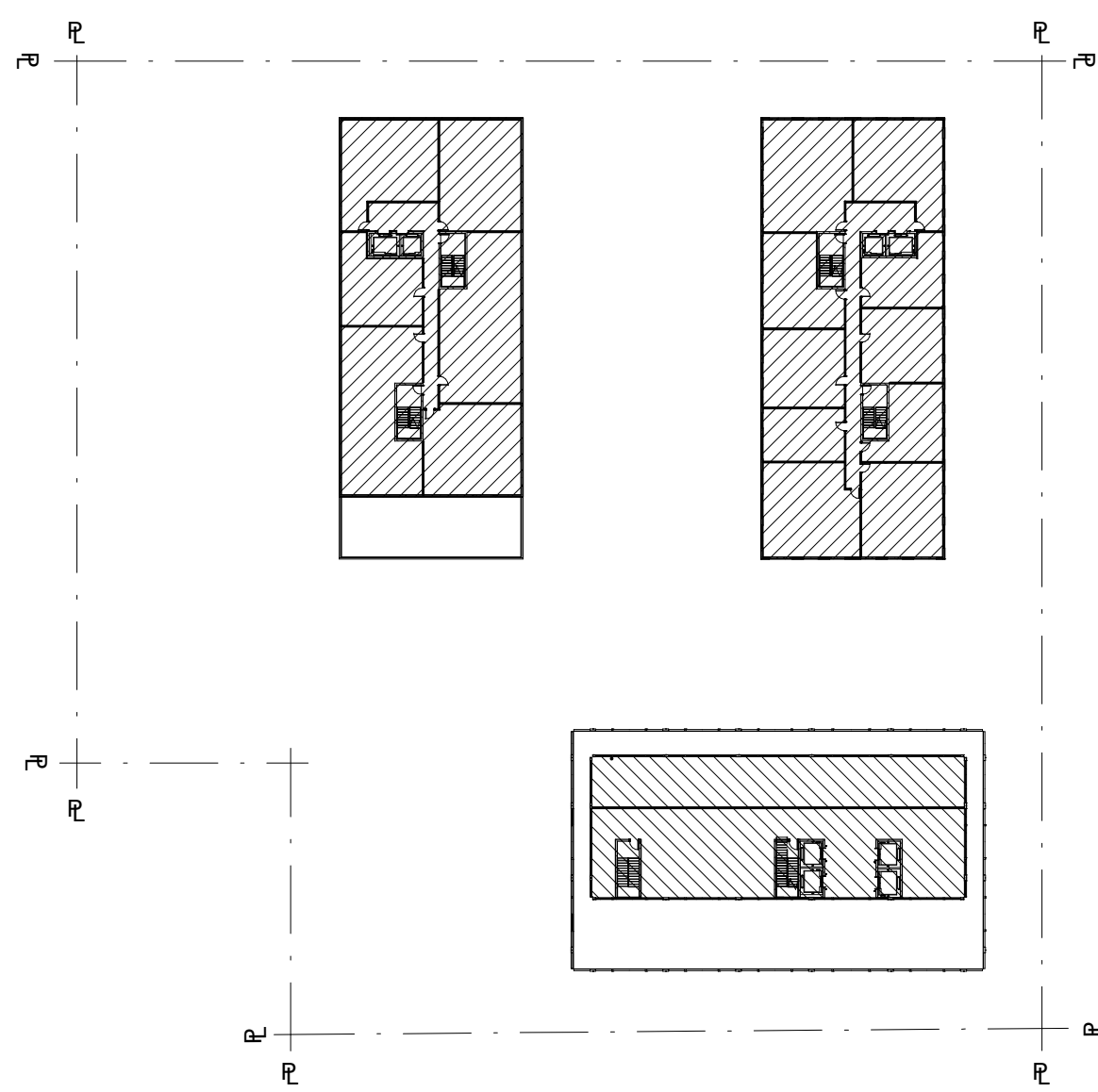
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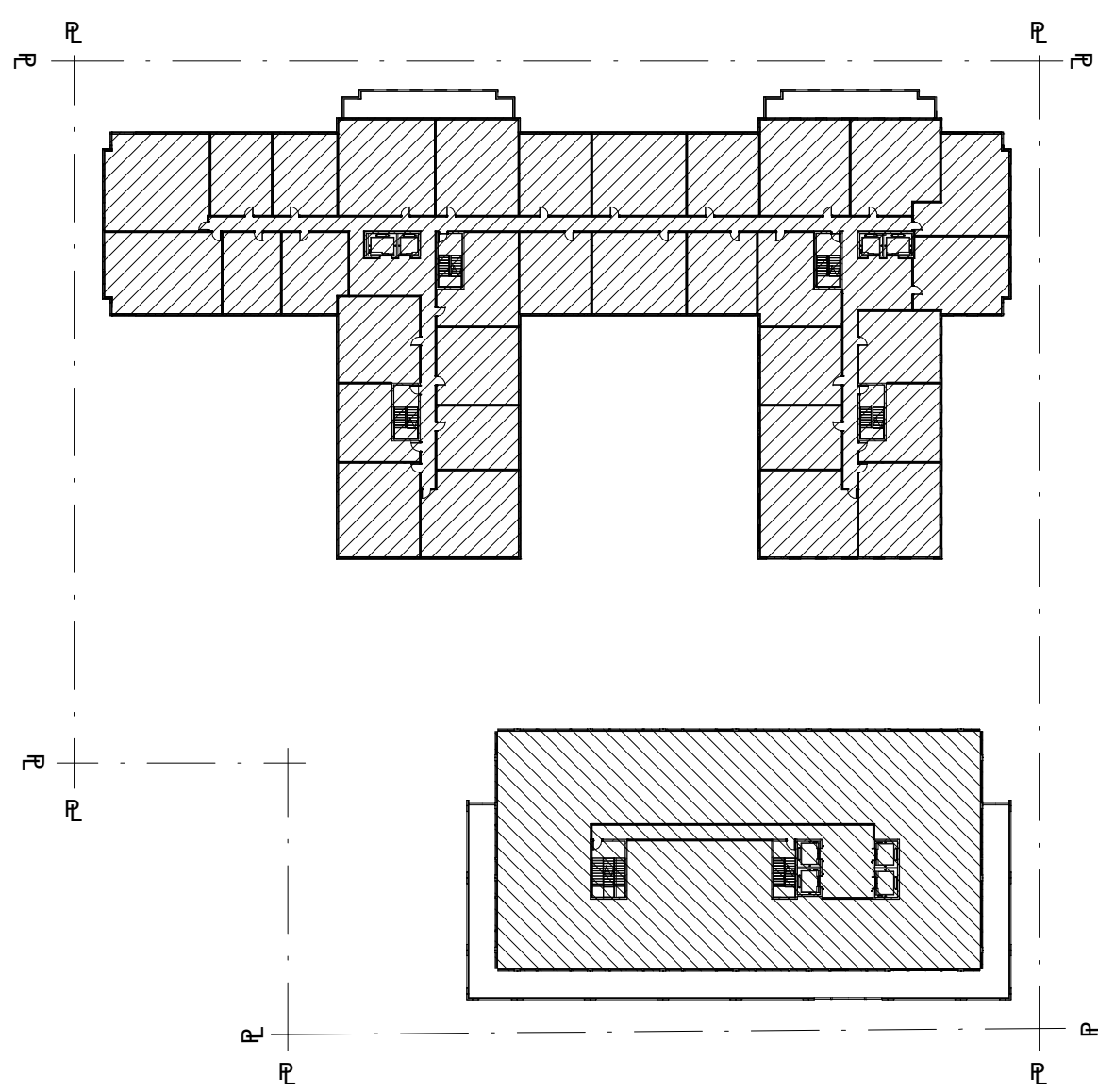


| 14TH FLOOR NORTH & 13TH FLOOR SOUTH COVERAGE |       |              |          |
|----------------------------------------------|-------|--------------|----------|
| PORTION                                      | FLOOR | AREA         | COVERAGE |
| NORTHEAST                                    | 14TH  | 10,140.00 SF | 9.24 %   |
| NORTHWEST                                    | 14TH  | 8,710.00 SF  | 7.93 %   |
| SOUTH                                        | 13TH  | 6,799.63 SF  | 6.19 %   |
| TOTAL                                        |       | 25,649.63 SF | 23.36 %  |



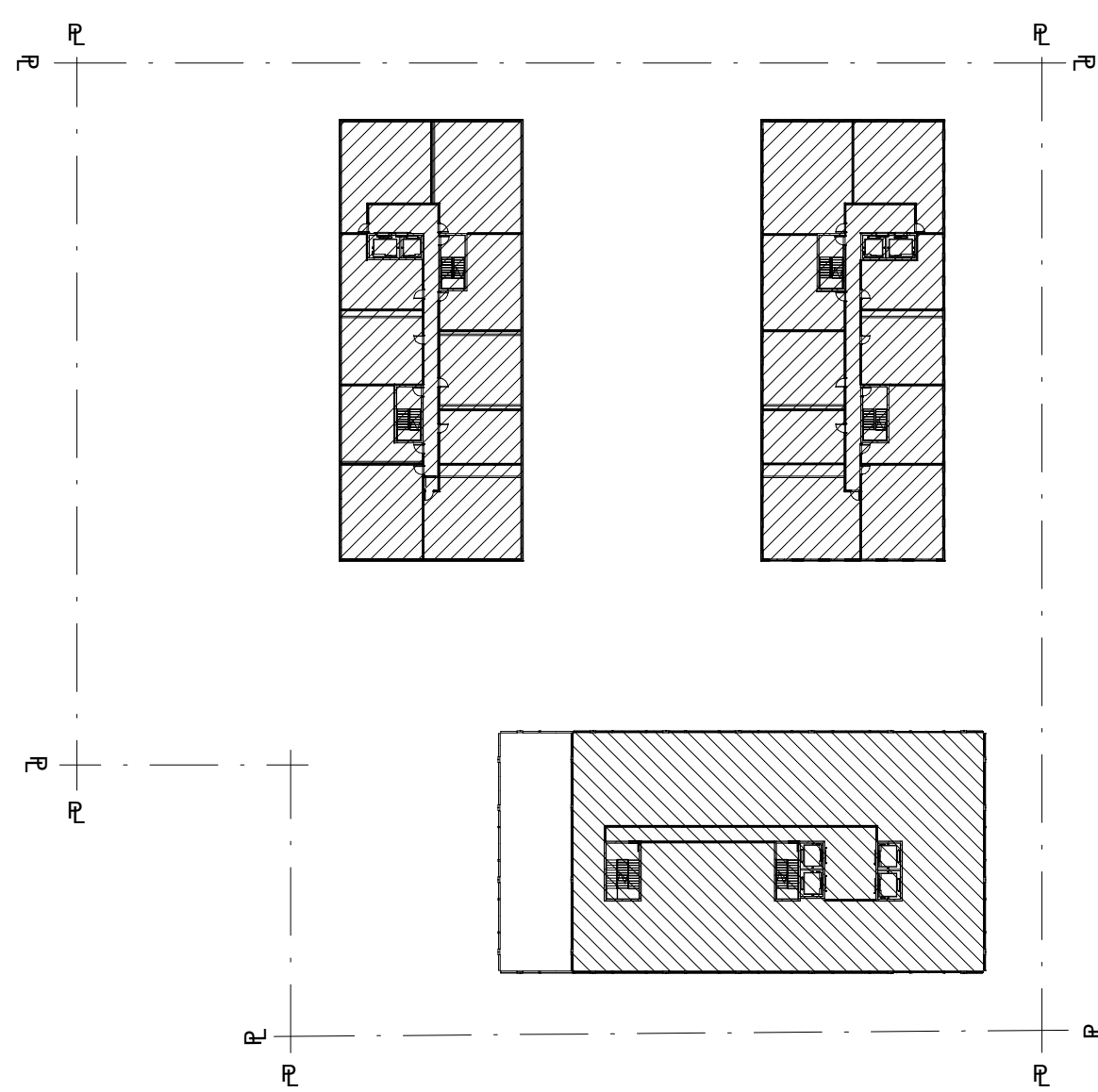
LOT COVERAGE - 14TH FLOOR  
NT & 13 FLOOR ST  
1/64" = 1'-0"

| 11TH FLOOR NORTH & 11TH FLOOR SOUTH COVERAGE |       |              |          |
|----------------------------------------------|-------|--------------|----------|
| PORTION                                      | FLOOR | AREA         | COVERAGE |
| NORTH                                        | 11TH  | 32,630.40 SF | 29.72 %  |
| SOUTH                                        | 11TH  | 14,753.70 SF | 13.44 %  |
| TOTAL                                        |       | 47,384.10 SF | 43.16 %  |



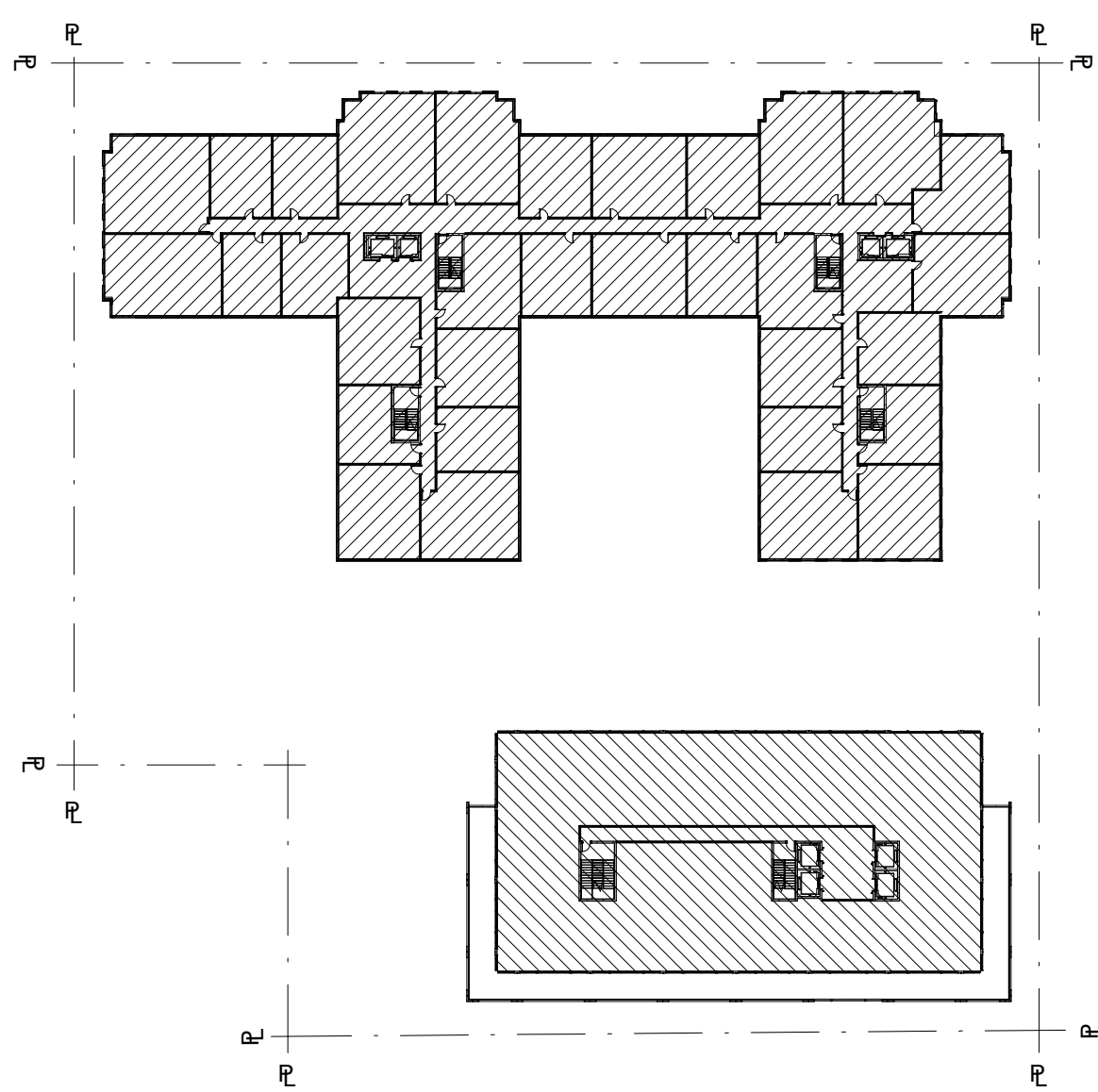
LOT COVERAGE - 11TH FLOOR  
NT & 11TH FLOOR ST  
1/64" = 1'-0"

| 13TH FLOOR NORTH & 12TH FLOOR SOUTH COVERAGE |       |              |          |
|----------------------------------------------|-------|--------------|----------|
| PORTION                                      | FLOOR | AREA         | COVERAGE |
| NORTHEAST                                    | 13TH  | 10,140.00 SF | 9.24 %   |
| NORTHWEST                                    | 13TH  | 10,140.00 SF | 9.24 %   |
| SOUTH                                        | 12TH  | 12,542.78 SF | 11.43 %  |
| TOTAL                                        |       | 32,822.78 SF | 29.91 %  |



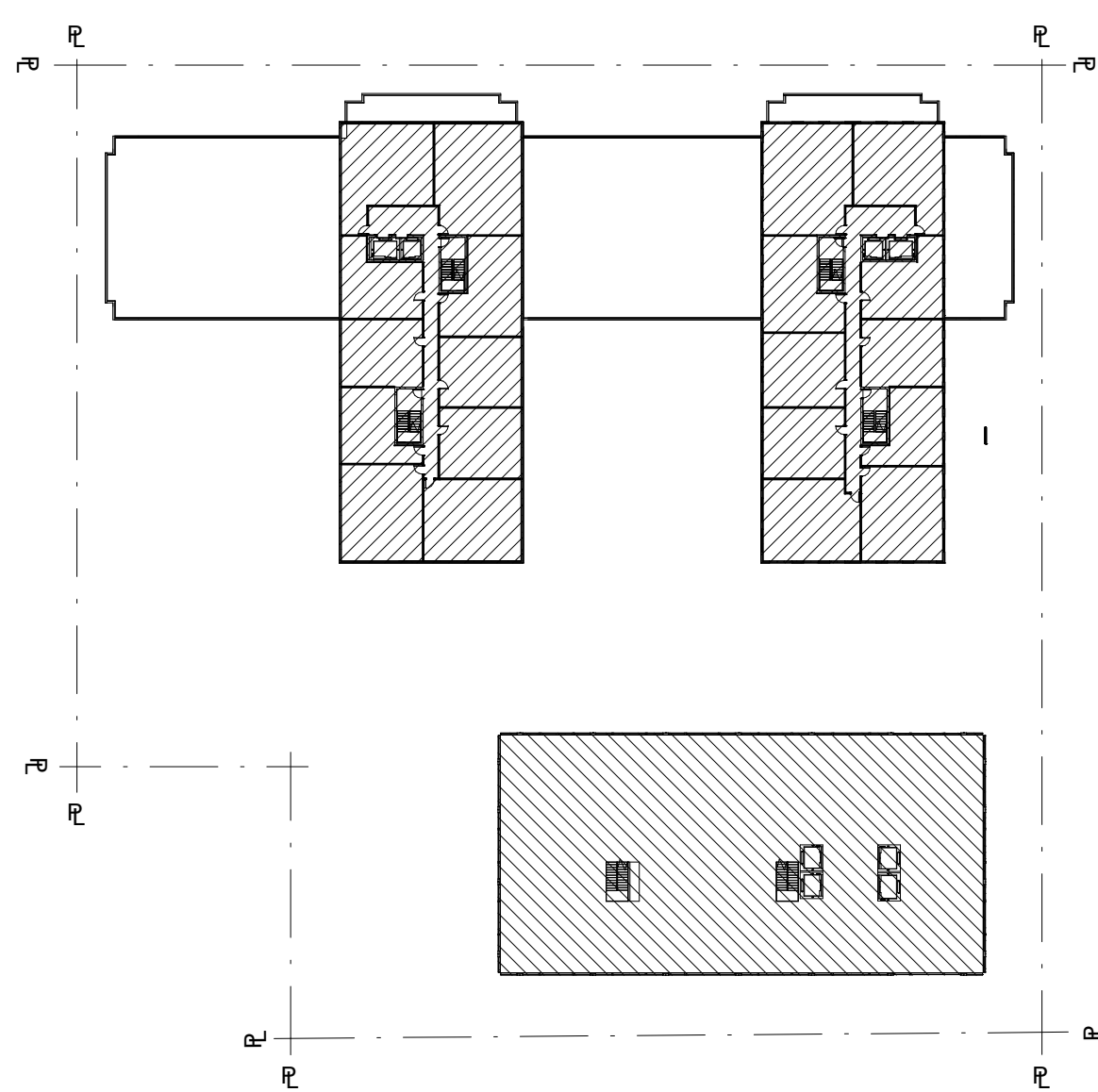
LOT COVERAGE - 13TH FLOOR  
NT & 12 FLOOR ST  
1/64" = 1'-0"

| 10TH FLOOR NORTH & 10TH FLOOR SOUTH COVERAGE |       |              |          |
|----------------------------------------------|-------|--------------|----------|
| PORTION                                      | FLOOR | AREA         | COVERAGE |
| NORTH                                        | 10TH  | 33,788.72 SF | 30.78 %  |
| SOUTH                                        | 10TH  | 14,753.70 SF | 13.44 %  |
| TOTAL                                        |       | 48,542.42 SF | 44.22 %  |



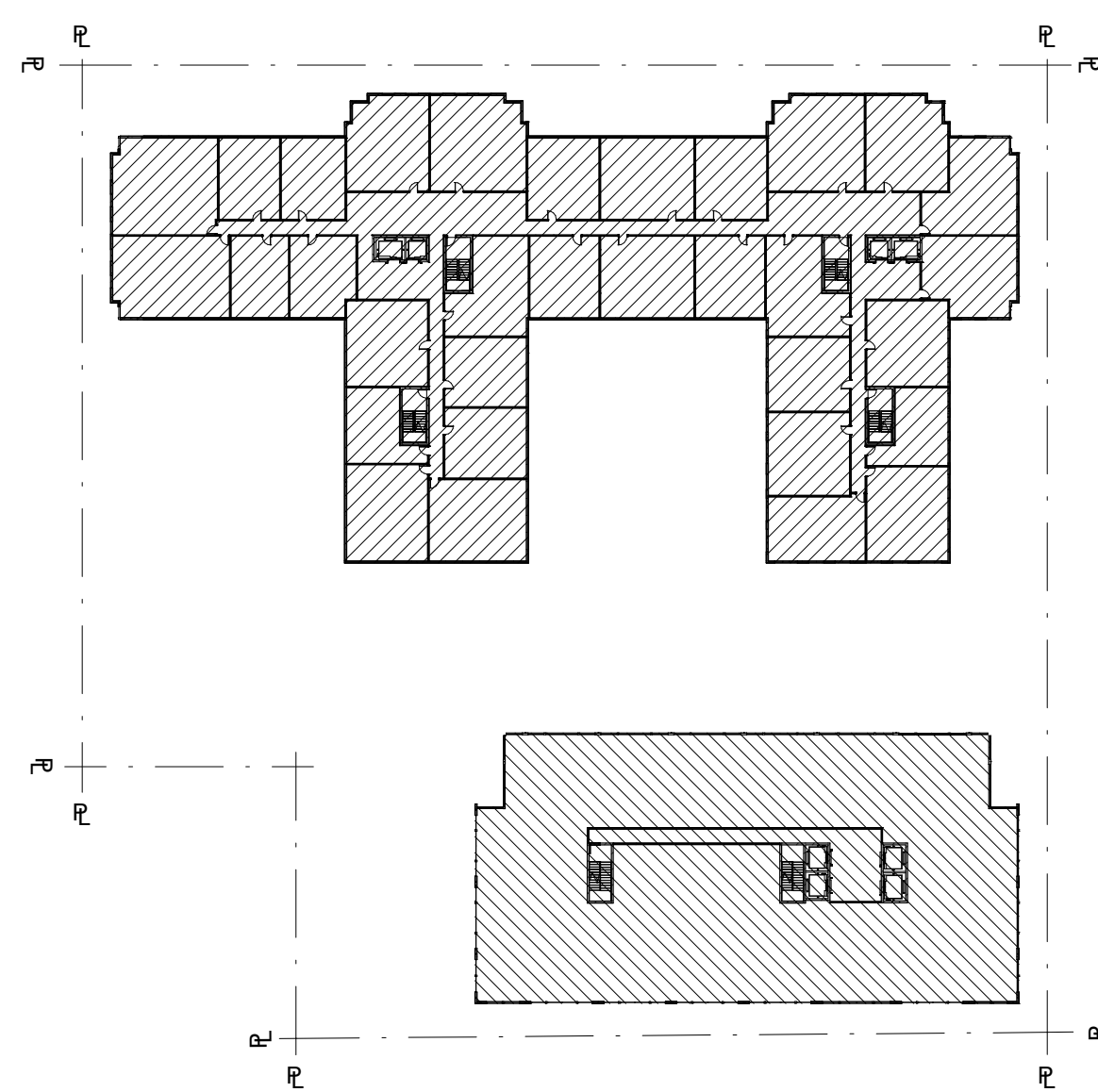
LOT COVERAGE - 10TH FLOOR  
NT & 10TH FLOOR ST  
1/64" = 1'-0"

| 12TH FLOOR NORTH & 11TH FLOOR SOUTH COVERAGE |       |              |          |
|----------------------------------------------|-------|--------------|----------|
| PORTION                                      | FLOOR | AREA         | COVERAGE |
| NORTHEAST                                    | 12TH  | 10,140.00 SF | 9.24 %   |
| NORTHWEST                                    | 12TH  | 10,140.00 SF | 9.24 %   |
| SOUTH                                        | 11TH  | 14,753.70 SF | 13.44 %  |
| TOTAL                                        |       | 35,033.70 SF | 31.92 %  |



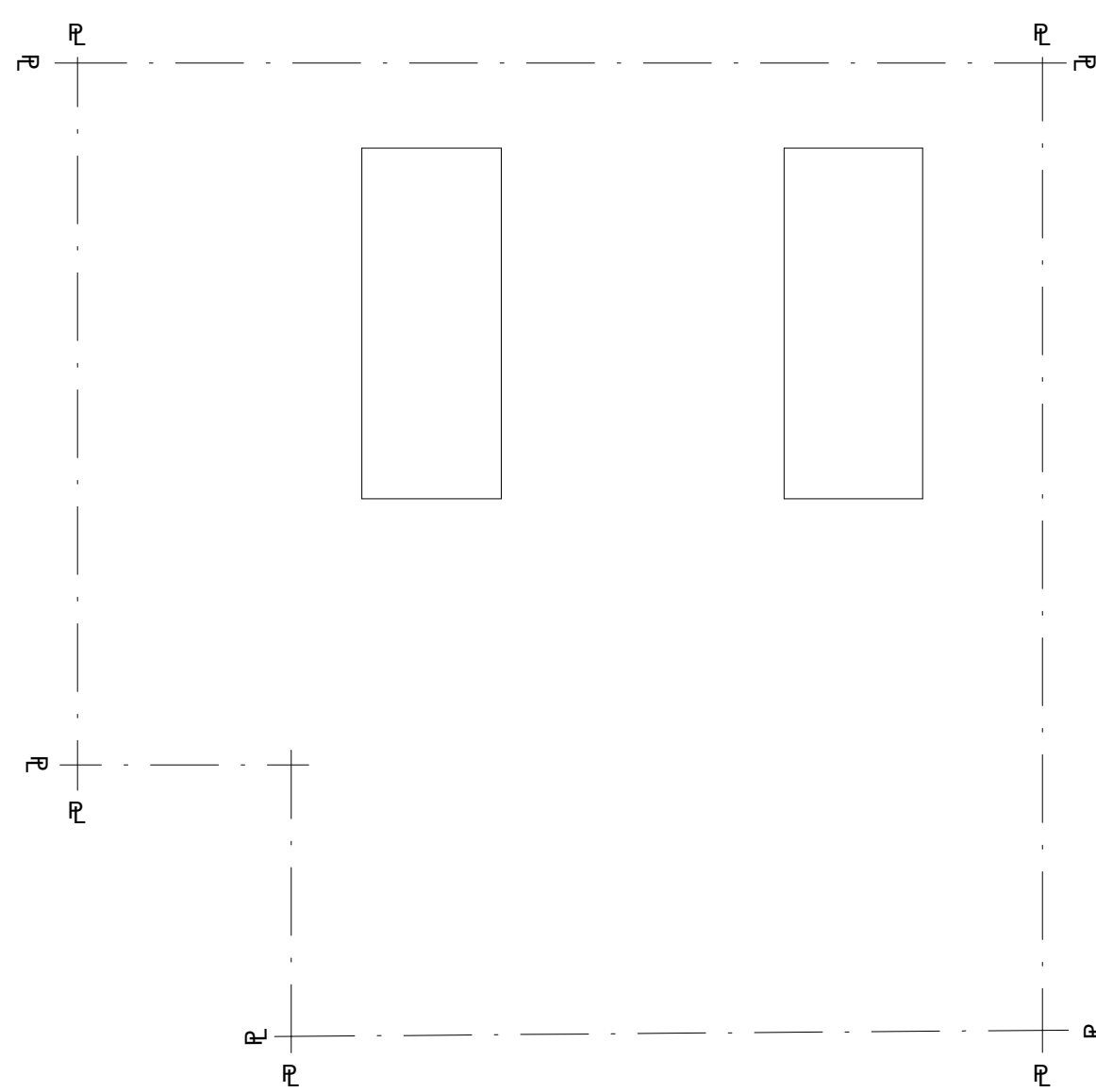
LOT COVERAGE - 12TH FLOOR  
NT & 11 FLOOR ST  
1/64" = 1'-0"

| 9TH FLOOR NORTH & 9TH FLOOR SOUTH COVERAGE |       |              |          |
|--------------------------------------------|-------|--------------|----------|
| PORTION                                    | FLOOR | AREA         | COVERAGE |
| NORTH                                      | 9TH   | 33,788.72 SF | 30.78 %  |
| SOUTH                                      | 9TH   | 17,868.58 SF | 16.28 %  |
| TOTAL                                      |       | 51,657.30 SF | 47.06 %  |



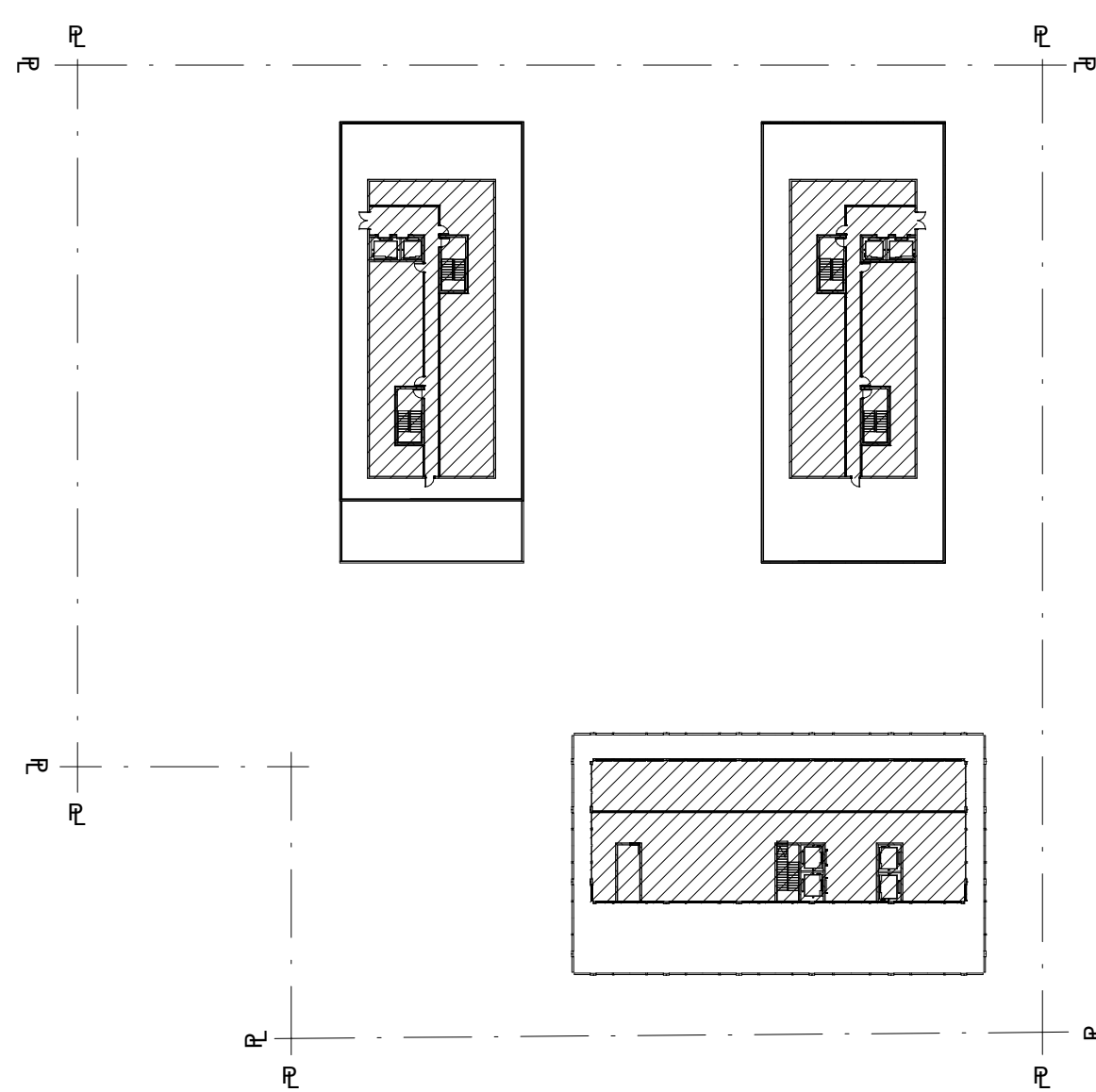
LOT COVERAGE 9TH FLOOR NT  
& 9TH FLOOR ST  
1/64" = 1'-0"

| ROOF NORTH COVERAGE |       |          |          |
|---------------------|-------|----------|----------|
| PORTION             | FLOOR | AREA     | COVERAGE |
| TOTAL               | ROOF  | 00.00 SF | 00.00 %  |
| TOTAL               |       | 00.00 SF | 00.00 %  |



LOT COVERAGE - ROOF NT  
1/64" = 1'-0"

| MECHANICAL FLOOR NORTH & ROOF SOUTH COVERAGE |       |             |          |
|----------------------------------------------|-------|-------------|----------|
| PORTION                                      | FLOOR | AREA        | COVERAGE |
| NORTHEAST                                    | MECH  | 4,751.25 SF | 00.00 %  |
| NORTHWEST                                    | MECH  | 4,776.97 SF | 00.00 %  |
| SOUTH                                        | ROOF  | 6,799.63 SF | 00.00 %  |
| TOTAL                                        |       | 00.00 SF    | 00.00 %  |



LOT COVERAGE - MECH.  
FLOOR NT & MECH. FLOOR ST  
1/64" = 1'-0"

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**AVERAGE GRADE CALCULATIONS:**

**PINE STREET:**

$$\frac{211.71' + 212.80'}{2} = 212.26'$$

**CHERRY STREET:**

$$\frac{214.71' + 215.03'}{2} = 214.87'$$

**ST. PAUL STREET NORTH:**

$$\frac{216.36' + 216.90'}{2} = 216.63'$$

**ST. PAUL STREET SOUTH:**

$$\frac{212.68' + 213.32'}{2} = 213.01'$$

**BANK STREET SOUTH:**

$$\frac{207.88' + 209.29' + 210.69'}{3} = 209.29'$$

- LEGEND:**
- |                                                                                       |                         |
|---------------------------------------------------------------------------------------|-------------------------|
|  | GREEN ROOF (11,015 SF)  |
|  | PV ARRAY                |
|  | PEDESTAL PAVER SYSTEM   |
|  | FLEXI-PAVE PLAY SURFACE |

NOT FOR CONSTRUCTION

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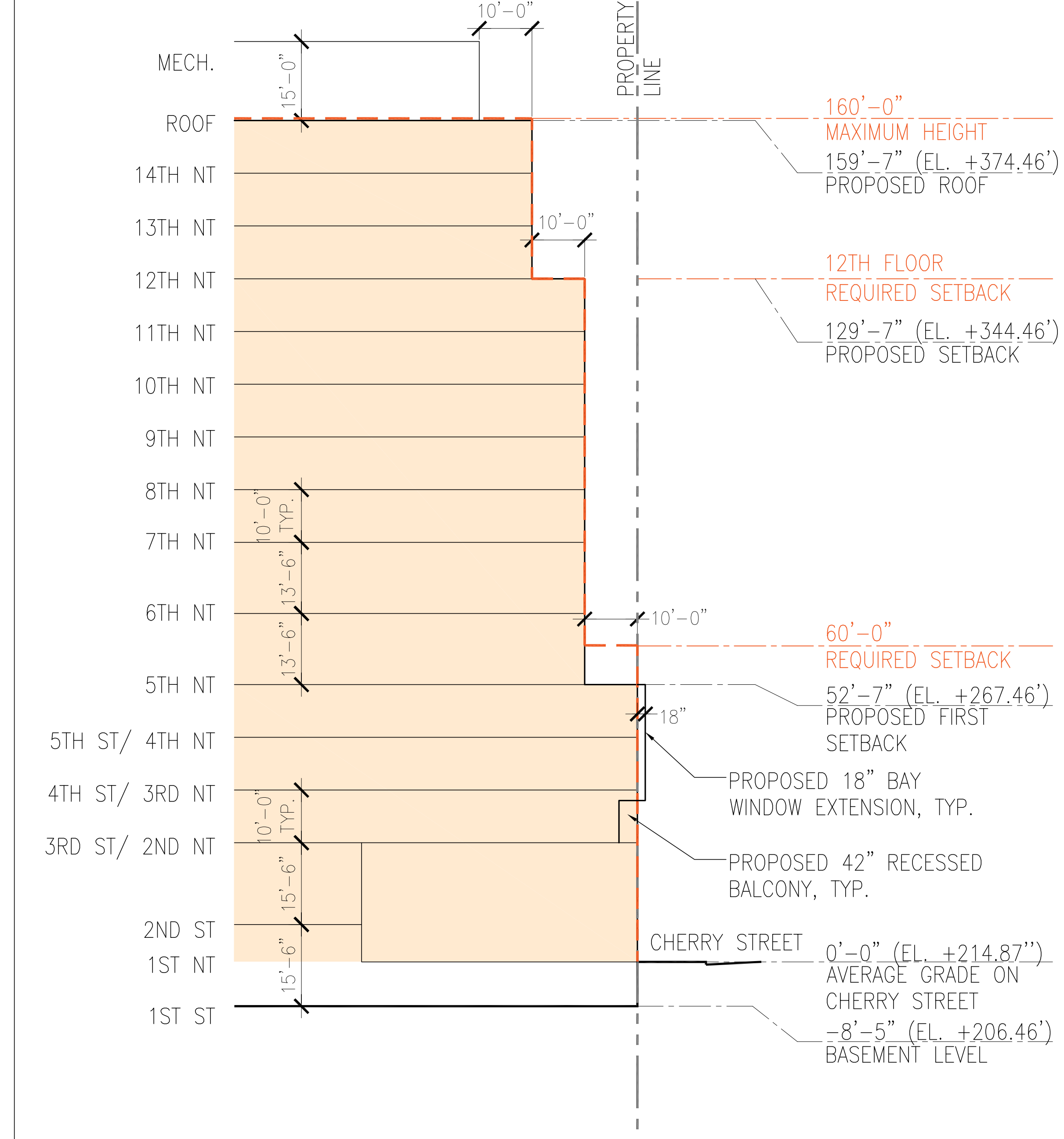
**Burlington Town Center**  
**Devonwood Investors, LLC**  
101 Cherry Street  
Burlington, VT 05401

## SITE PLAN

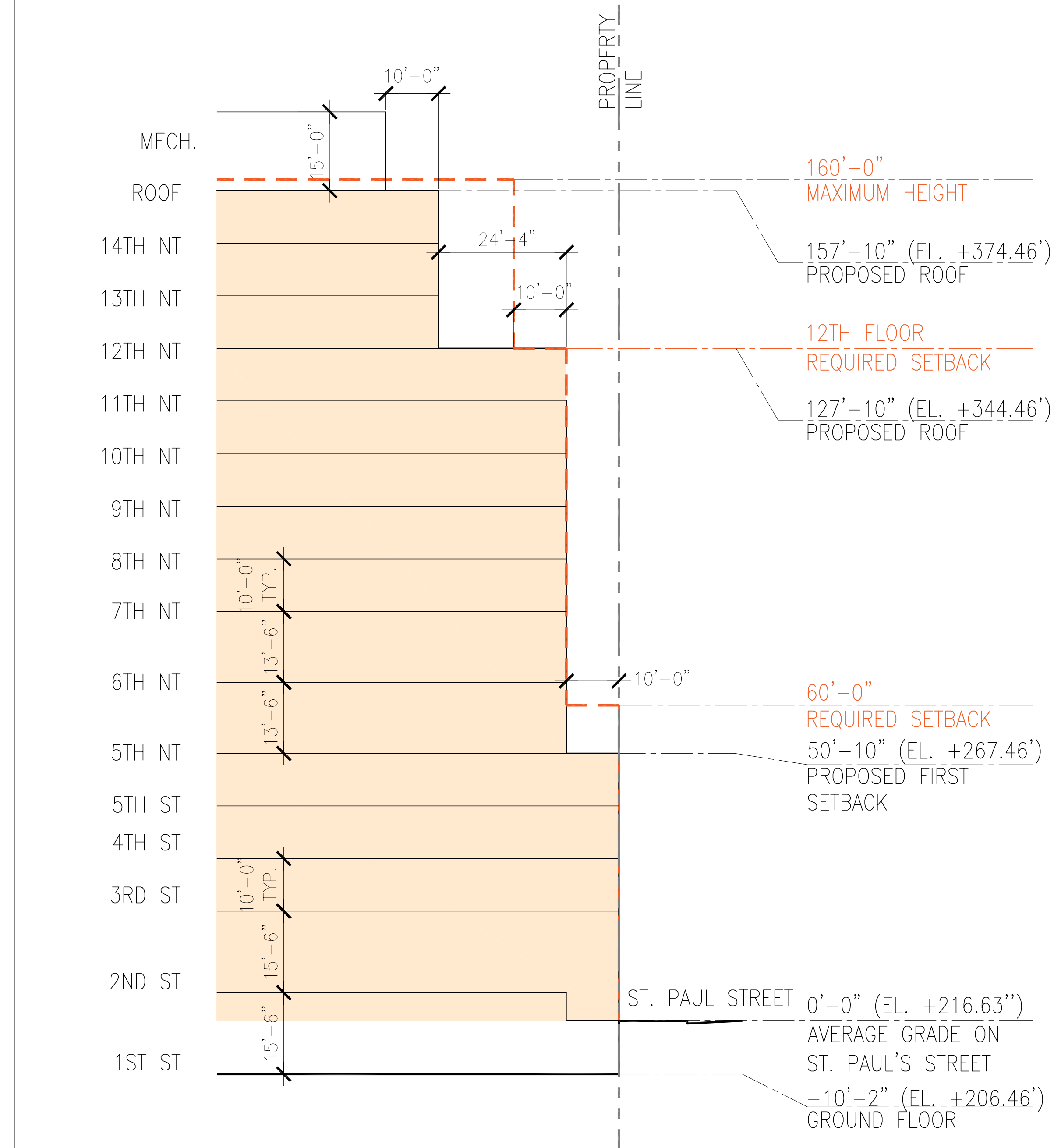
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|---------------------------------------|-------------------|
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| Drawn By:<br><br><b>Designer</b>      |                   |
| Checked By:<br><br><b>Checker</b>     |                   |
| Scale:<br><br><b>As indicated</b>     |                   |
| Drawing Number:                       |                   |

Z-003

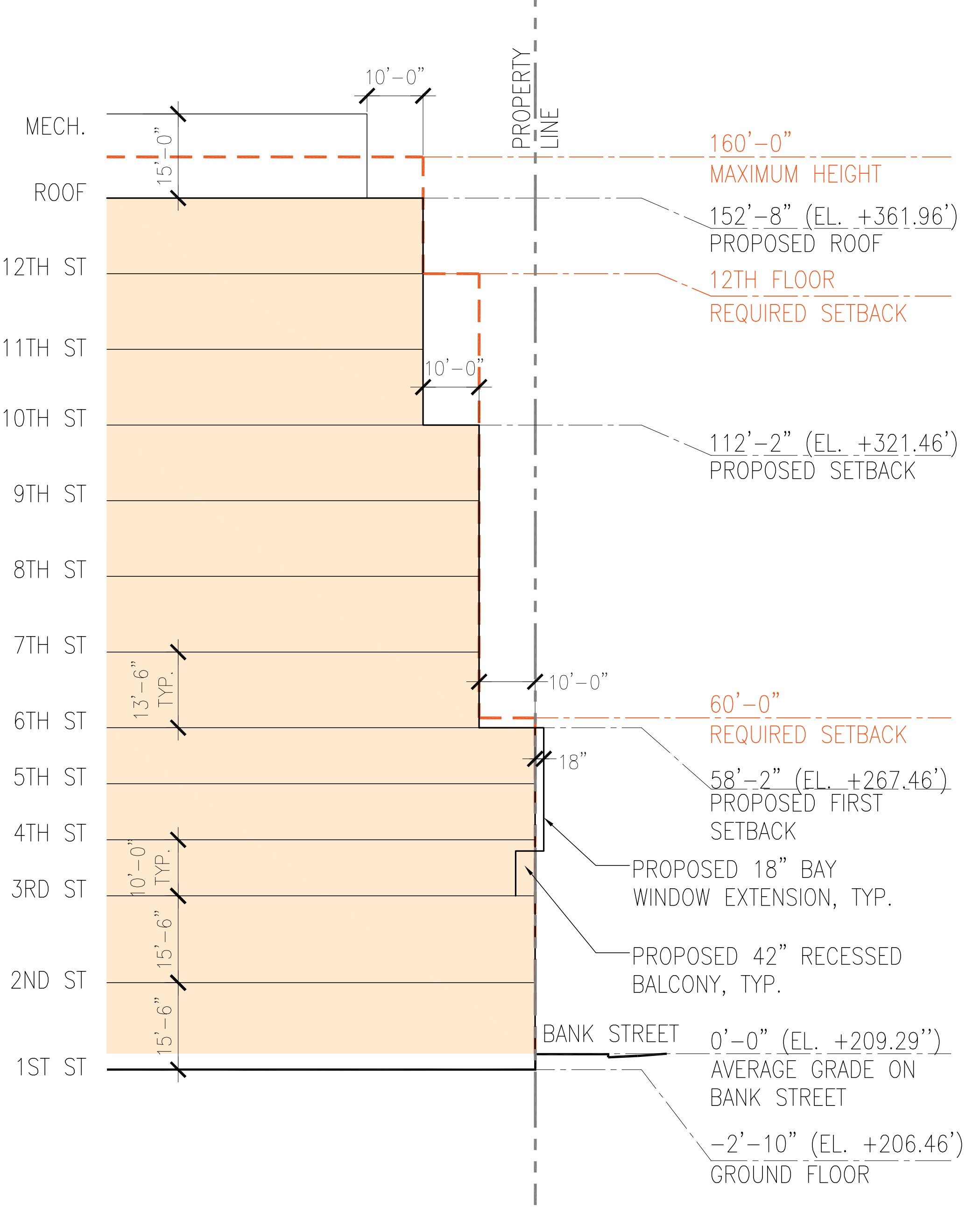




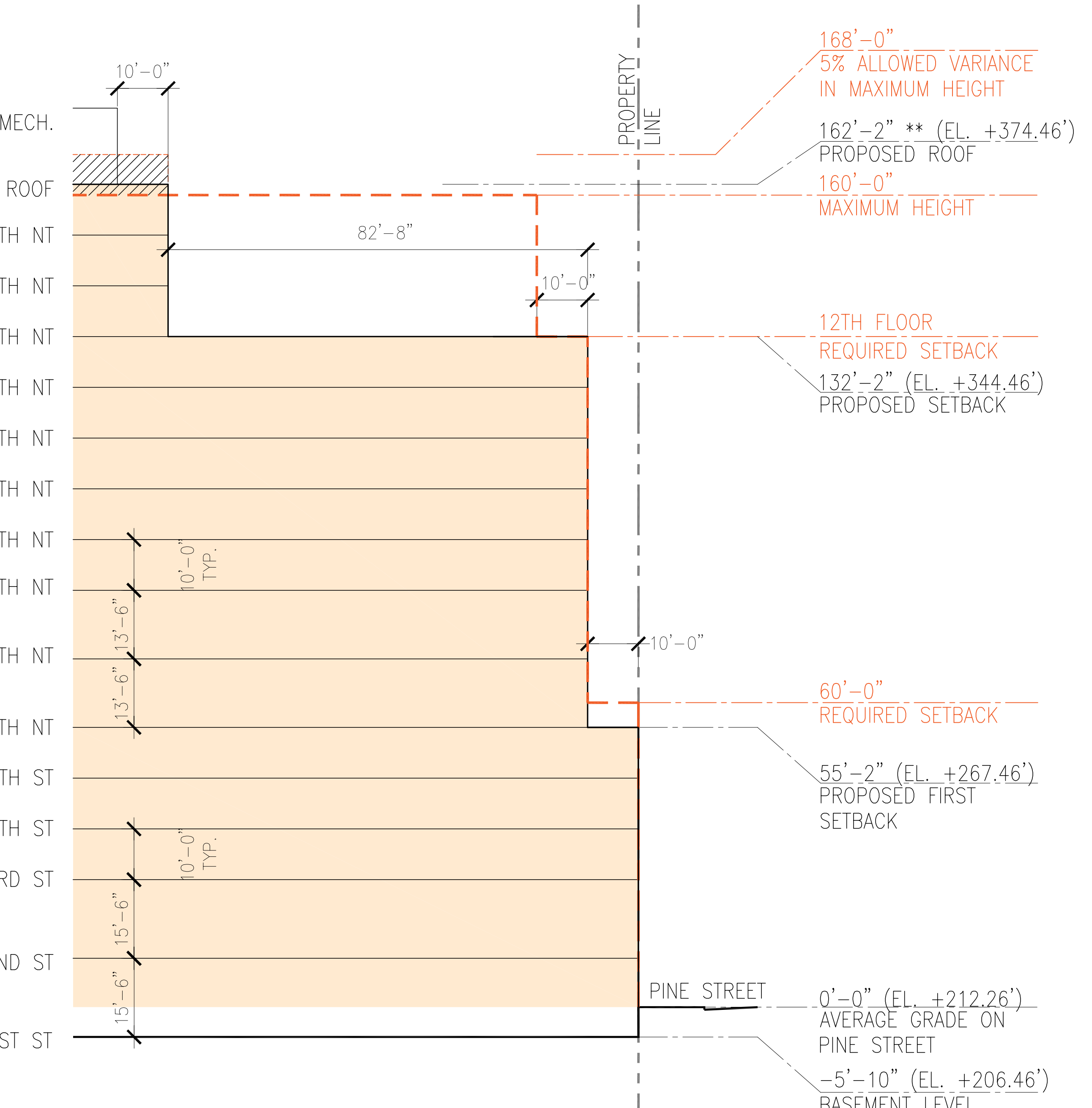
01 PROPOSED NORTH TOWER BUILDING SETBACK - CHERRY STREET  
1/16" = 1'-0"



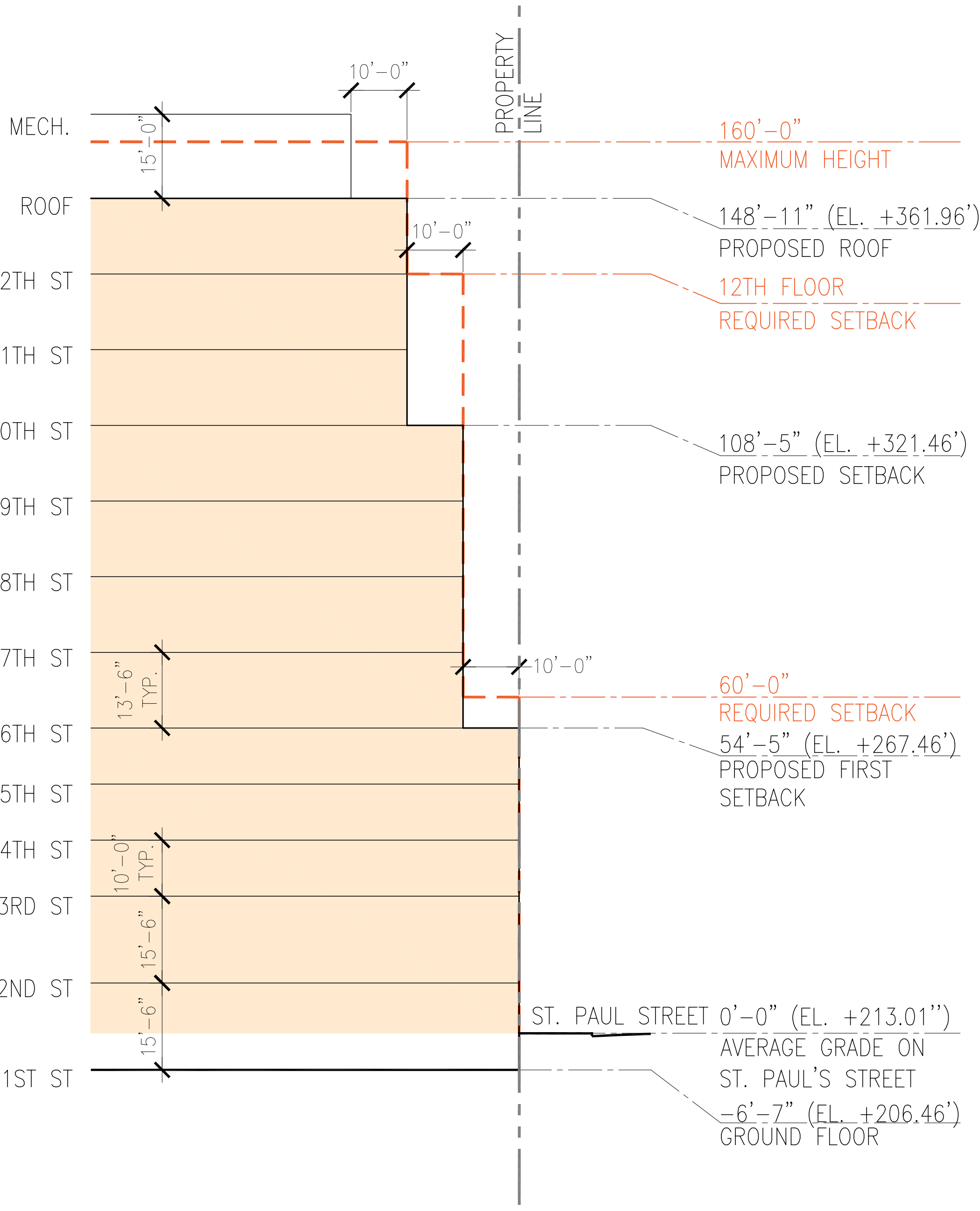
04 PROPOSED NORTH TOWER BUILDING SETBACK - ST PAUL ST NORTH  
1/16" = 1'-0"



02 PROPOSED SOUTH TOWER BUILDING SETBACK - BANK STREET  
1/16" = 1'-0"



05 PROPOSED NORTH TOWER BUILDING SETBACK - PINE STREET  
1/16" = 1'-0"



03 PROPOSED SOUTH TOWER BUILDING SETBACK - ST PAUL ST SOUTH  
1/16" = 1'-0"

- MAXIMUM ZONING ENVELOPE
- PROPOSED BUILDING ENVELOPE
- PROPOSED BUILDING BEYOND ZONING ENVELOPE, WITHIN 5% VARIATION \*\*

\*\* 5% HEIGHT VARIATION IN THE MAXIMUM BUILDING HEIGHT IS ALLOWED FOR GRADE CHANGES ACROSS THE SITE. THE ADDITIONAL HEIGHT DOES NOT ENABLE THE CREATION OF AN ADDITIONAL STORY BEYOND THE MAXIMUM PERMITTED. 5'-7" HEIGHT INCREASE @ PINE STREET NORTH TOWER = 3.48% OF 160'-0"

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| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |
| Date       | No. | Description          |

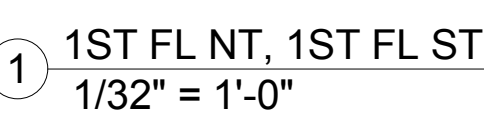
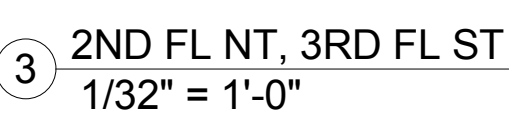
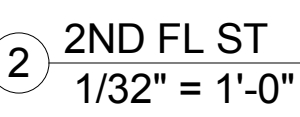
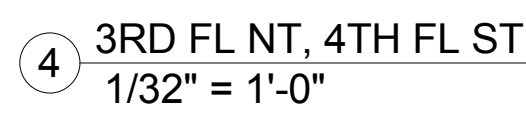
**Burlington Town Center,**  
**Devonwood Investors, LLC**  
101 Cherry Street  
Burlington, VT 05401

**BUILDING SECTIONS**

|                            |                   |
|----------------------------|-------------------|
| Project Number:<br>1317-01 | Signature & Date: |
| Drawn By:                  |                   |
| Checked By:                |                   |
| Date:                      |                   |
| AS NOTED                   |                   |

**Z-021**

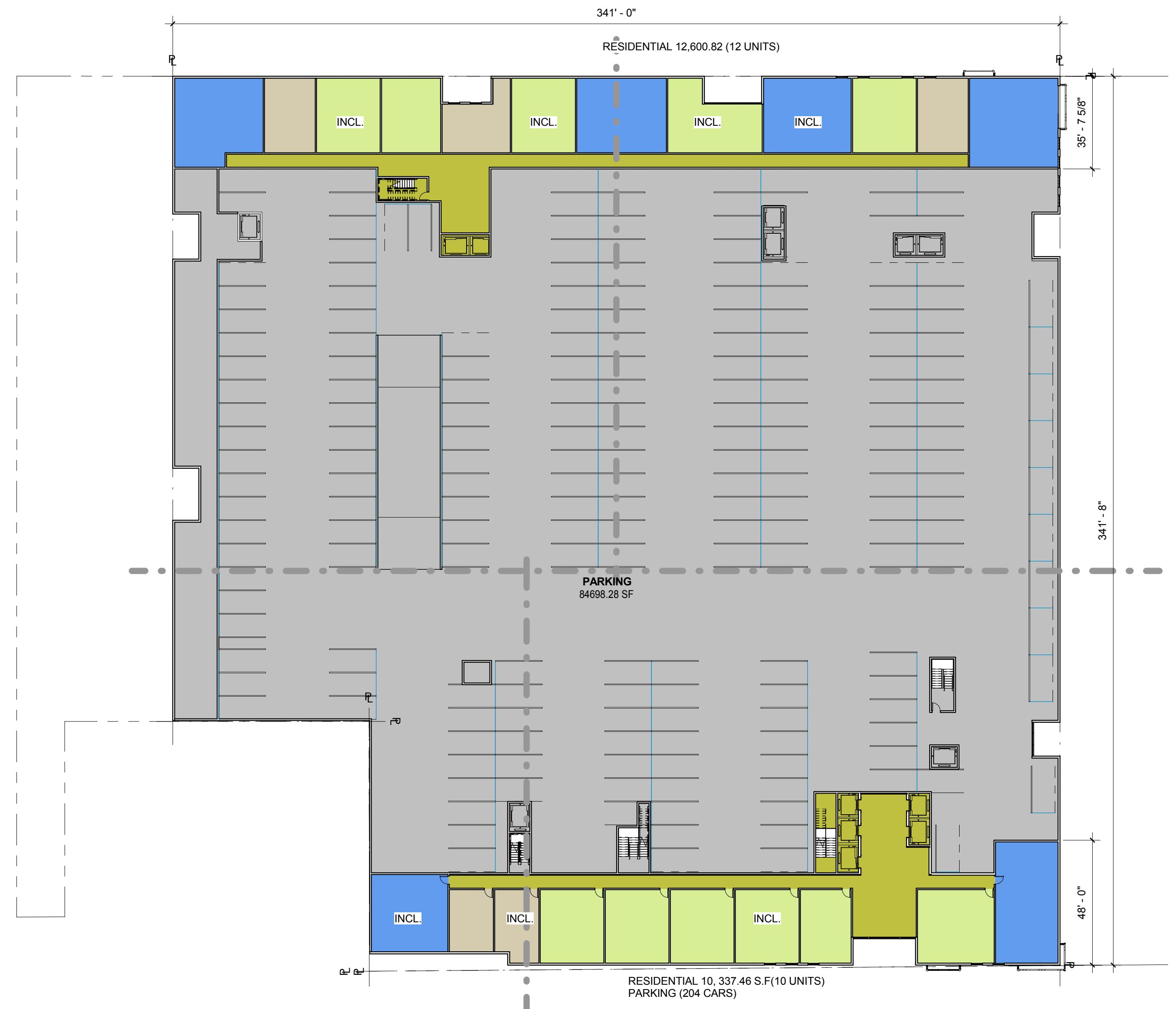
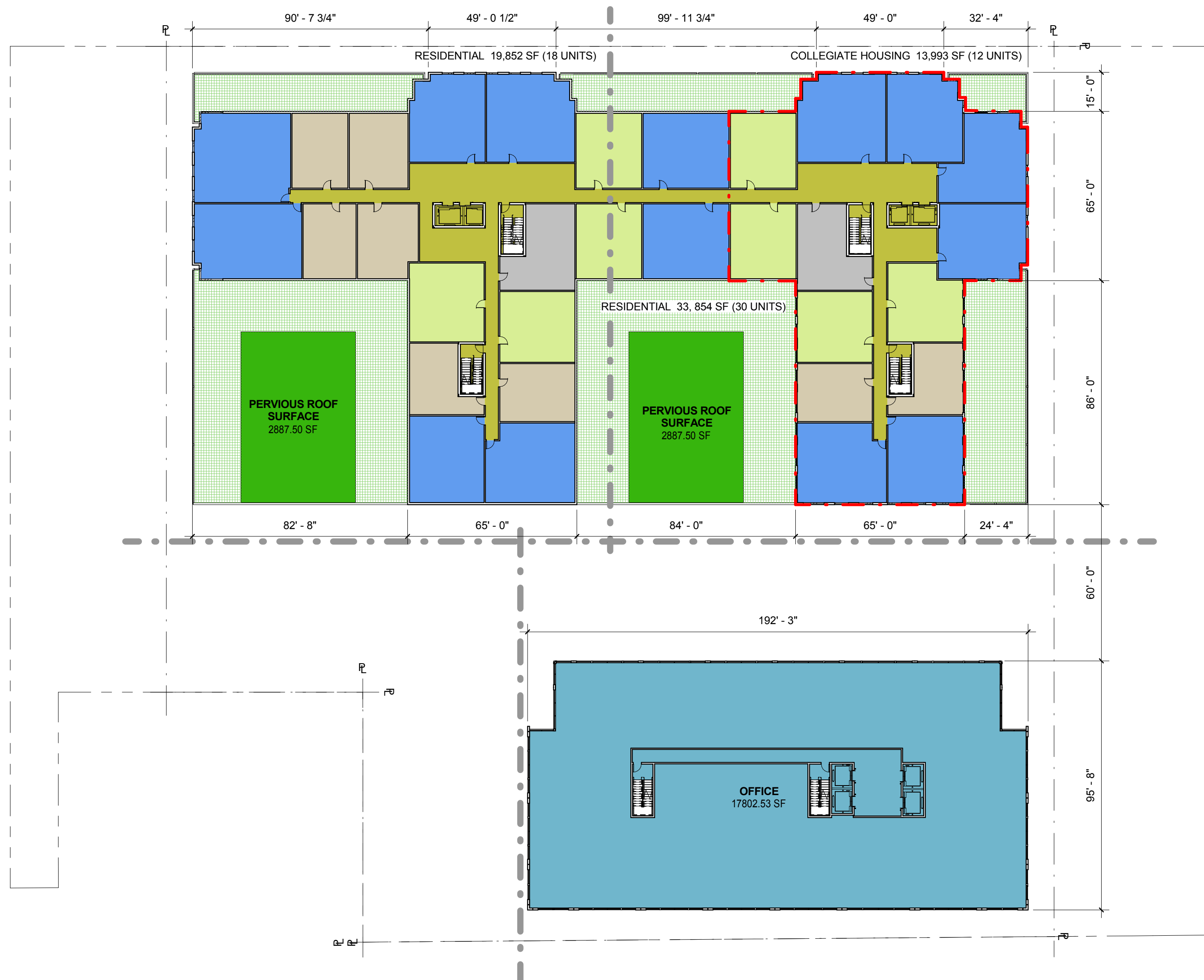
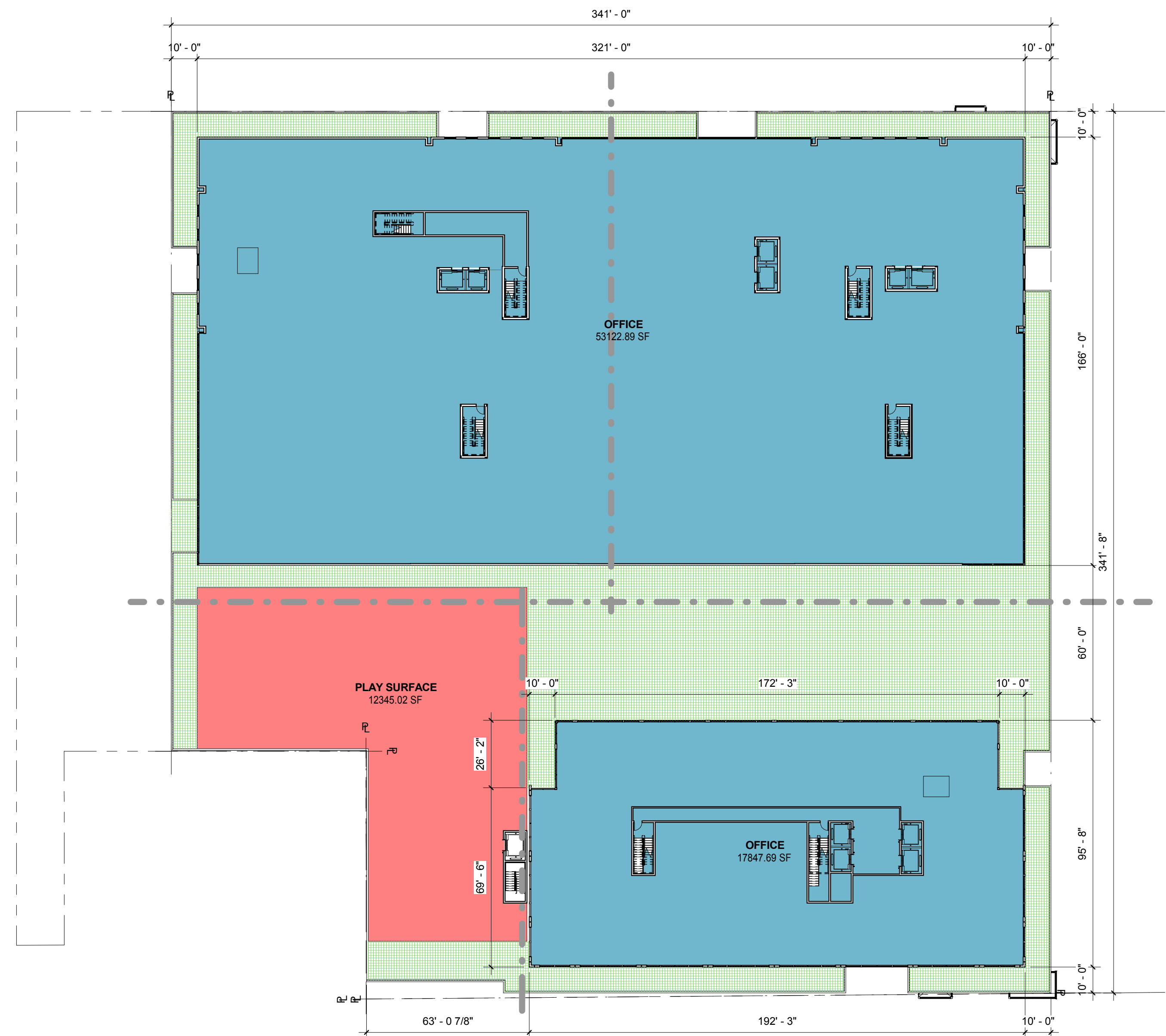
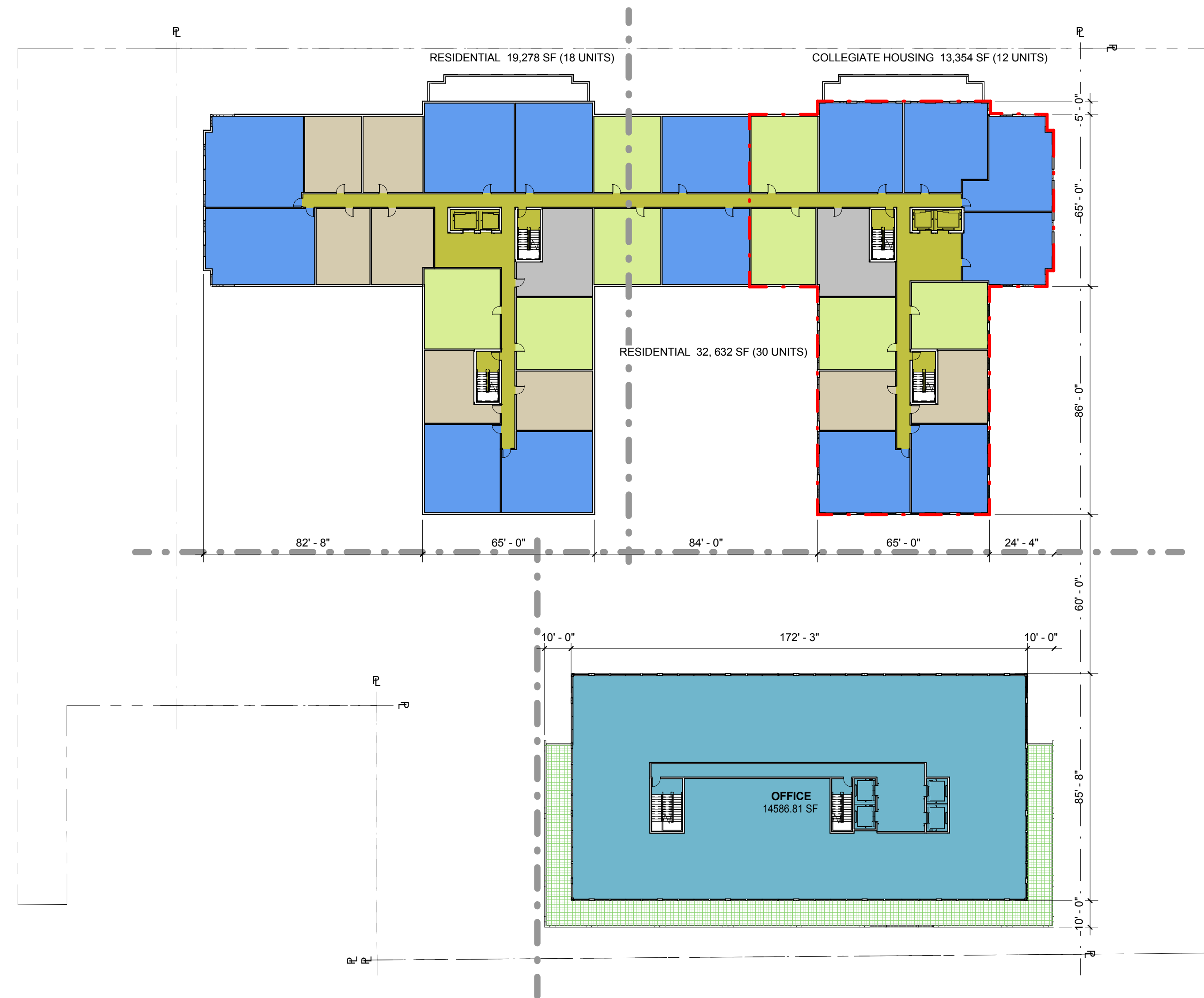


[illegible]

# FLOOR PLANS 1-4TH FLOOR

|                 |                   |
|-----------------|-------------------|
| Project Number: | Signature & Seal: |
| 1317-01         |                   |
| Drawn By:       |                   |
| Designer        |                   |
| Checked By:     |                   |
| Checker         |                   |
| Scale:          |                   |
| As indicated    |                   |
| Drawing Number: |                   |





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Approval

Project

12/15/16 P&Z Submission

1/11/16 P&Z Resubmission I

Date No. Description

Project

Burlington Town Center

Devonwood Investors, LLC

101 Cherry Street

Burlington, VT 05401

Design Title

FLOOR PLANS

4TH-11TH FLOORS

Project Number

1317-01

Drawn By

Designer

Checked By

Checker

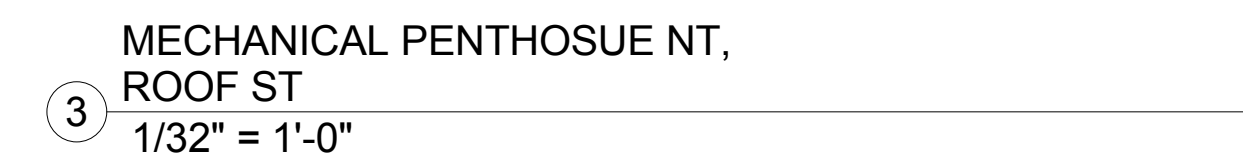
Scale

As indicated

Drawing Number

A-052

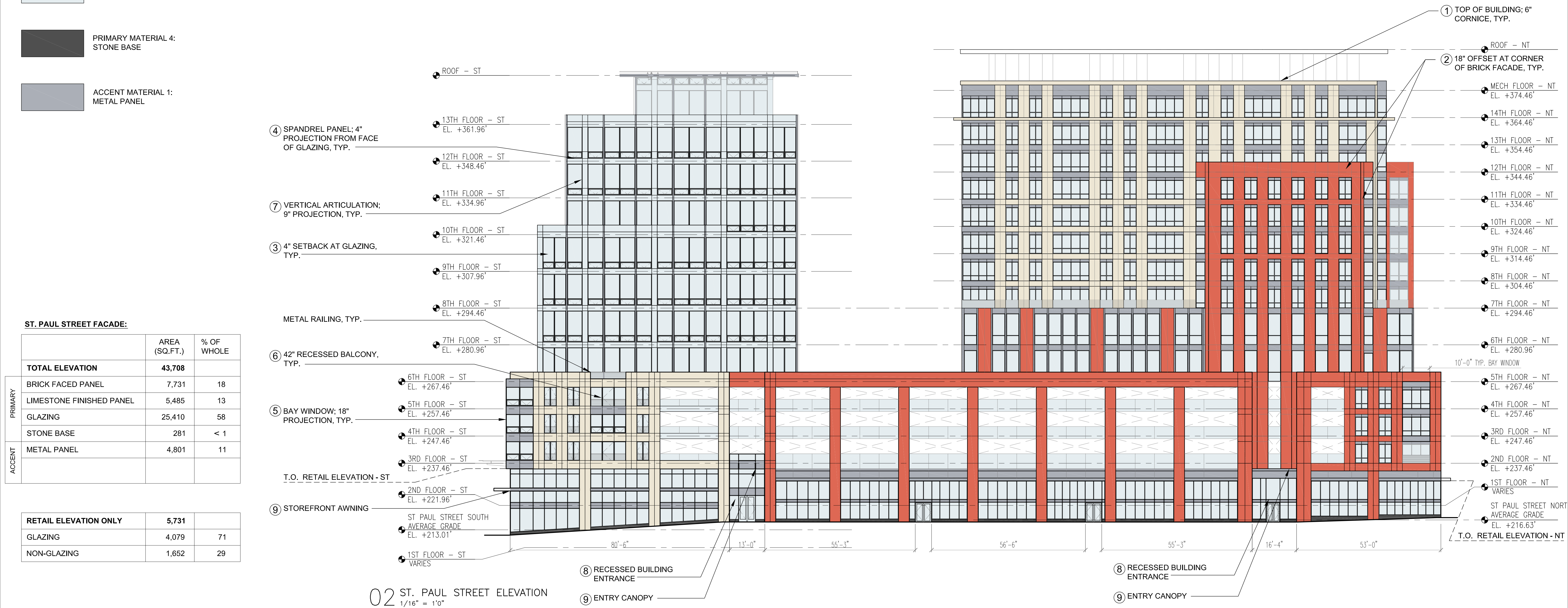


[illegible]

|                                                                                                          |                                                                                  |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <h1 style="text-align: center;">FLOOR PLANS 12TH FLOOR - ROOF</h1>                                       |                                                                                  |
| Project Number:<br><div style="border: 1px solid black; padding: 5px; text-align: center;">1317-01</div> | Signature & Date:<br><div style="border: 1px solid black; height: 100px;"></div> |
| Drawn By:<br><div style="border: 1px solid black; padding: 5px; text-align: center;">Designer</div>      |                                                                                  |
| Checked By:<br><div style="border: 1px solid black; padding: 5px; text-align: center;">Checker</div>     |                                                                                  |
| Date:<br><div style="border: 1px solid black; padding: 5px; text-align: center;">As indicated</div>      |                                                                                  |

A-053





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| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |

Project:

**Burlington Town Center, Devonwood Investors, LLC**

101 Cherry Street  
Burlington, VT 05401

Drawn by: CH

Checked by: JH/WF

Scale: AS NOTED

Project Number: 1317-01

AS NOTED

**ELEVATIONS - CHERRY STREET & ST. PAULS STREET**

**A-201**



| BANK STREET FACADE: |                          |                  |               |
|---------------------|--------------------------|------------------|---------------|
| PRIMARY             |                          | AREA<br>(SQ.FT.) | % OF<br>WHOLE |
|                     | TOTAL ELEVATION          | 35,493           |               |
|                     | BRICK FACED PANEL        | 1,978            | 6             |
|                     | LIMESTONE FINISHED PANEL | 3,853            | 11            |
|                     | GLAZING                  | 27,418           | 77            |
| ACCENT              | STONE BASE               | 161              | < 1           |
|                     | METAL PANEL              | 2,083            | 6             |

| RETAIL ELEVATION ONLY |       |    |
|-----------------------|-------|----|
| GLAZING               | 4,523 | 77 |
| NON-GLAZING           | 1,382 | 23 |

MATERIAL LEGEND

|             |                                                 |
|-------------|-------------------------------------------------|
| <div></div> | PRIMARY MATERIAL 1A:<br>BRICK FACED PANEL       |
| <div></div> | PRIMARY MATERIAL 1B:<br>BRICK FACED PANEL       |
| <div></div> | PRIMARY MATERIAL 2:<br>LIMESTONE FINISHED PANEL |
| <div></div> | PRIMARY MATERIAL 3:<br>GLAZING                  |
| <div></div> | PRIMARY MATERIAL 4:<br>STONE BASE               |
| <div></div> | ACCENT MATERIAL 1:<br>METAL PANEL               |

| PINE STREET FACADE: |                          |                  |               |
|---------------------|--------------------------|------------------|---------------|
| PRIMARY             |                          | AREA<br>(SQ.FT.) | % OF<br>WHOLE |
|                     | TOTAL ELEVATION          | 30,956           |               |
|                     | BRICK FACED PANEL        | 7,749            | 25            |
|                     | LIMESTONE FINISHED PANEL | 4,796            | 15            |
|                     | GLAZING                  | 14,819           | 48            |
| ACCENT              | STONE BASE               | 194              | 1             |
|                     | METAL PANEL              | 3,398            | 11            |

| RETAIL ELEVATION ONLY |       |    |
|-----------------------|-------|----|
| GLAZING               | 4,329 | 75 |
| NON-GLAZING           | 1,443 | 25 |



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|            |     |                      |
|------------|-----|----------------------|
| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |
| Date       | No. | Description          |

Burlington Town Center,  
Devonwood Investors, LLC

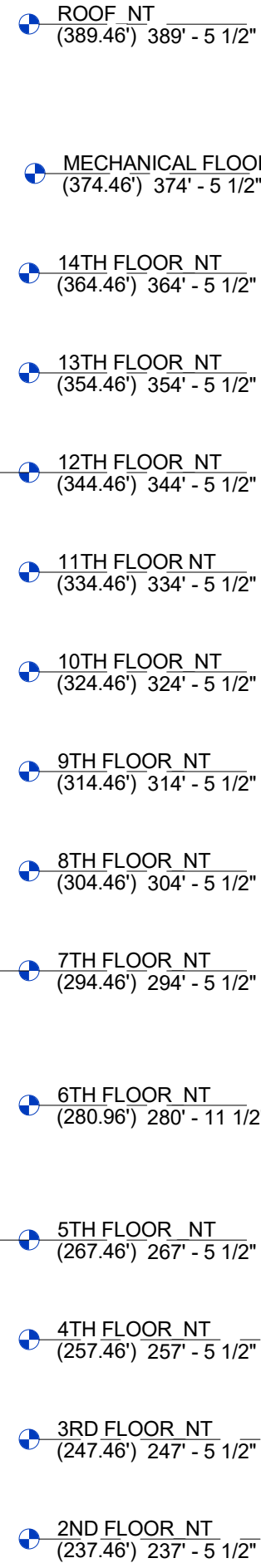
101 Cherry Street  
Burlington, VT 05401

ELEVATIONS -  
BANK STREET &  
PINE STREET

|                           |                  |
|---------------------------|------------------|
| Project Number<br>1317-01 | Signature & Seal |
| Drawn By<br>CH            |                  |
| Checked By<br>JH/WF       |                  |
| Scale<br>AS NOTED         |                  |

A-202





1  
A-101

Approval: \_\_\_\_\_

|          |     |                    |
|----------|-----|--------------------|
| 12/15/16 |     | P&Z Submission     |
| 1/11/16  |     | P&Z Resubmission I |
| Date     | No. | Description        |

Burlington Town Center  
Devonwood Investors, LLC

101 Cherry Street  
Burlington, VT 05401

## BUILDING SECTION

|                 |                  |
|-----------------|------------------|
| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
| Checked By:     |                  |
| Checker         |                  |
| Scale:          |                  |
| 1/16" = 1'-0"   |                  |

A-211



[illegible]

101 Cherry Street  
Burlington, VT 05401

|                 |                  |
|-----------------|------------------|
| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
| Checked By:     |                  |
| Checker         |                  |
| Scale:          |                  |
| 1" = 1'-0"      |                  |

A-221

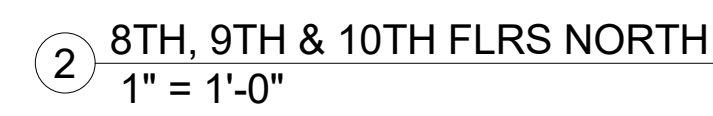
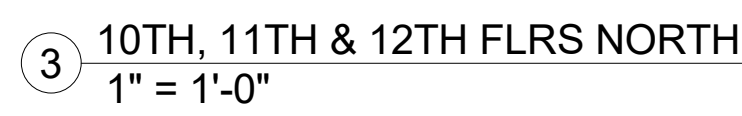


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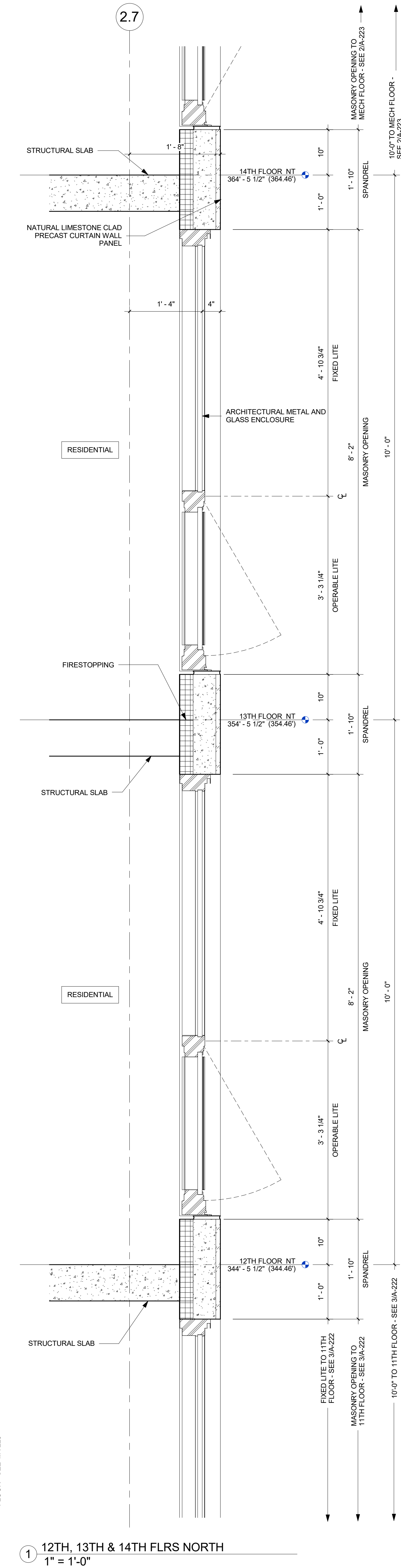
101 Cherry Street  
Burlington, VT 05401

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| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
| Checked By:     |                  |
| Checker         |                  |
| Scale:          |                  |
| 1" = 1'-0"      |                  |
| Drawing Number: |                  |

**Drawing:**







1 12TH, 13TH & 14TH FLRS NORTH  
1" = 1'-0"

[illegible]101 Cherry Street  
Burlington, VT 05401

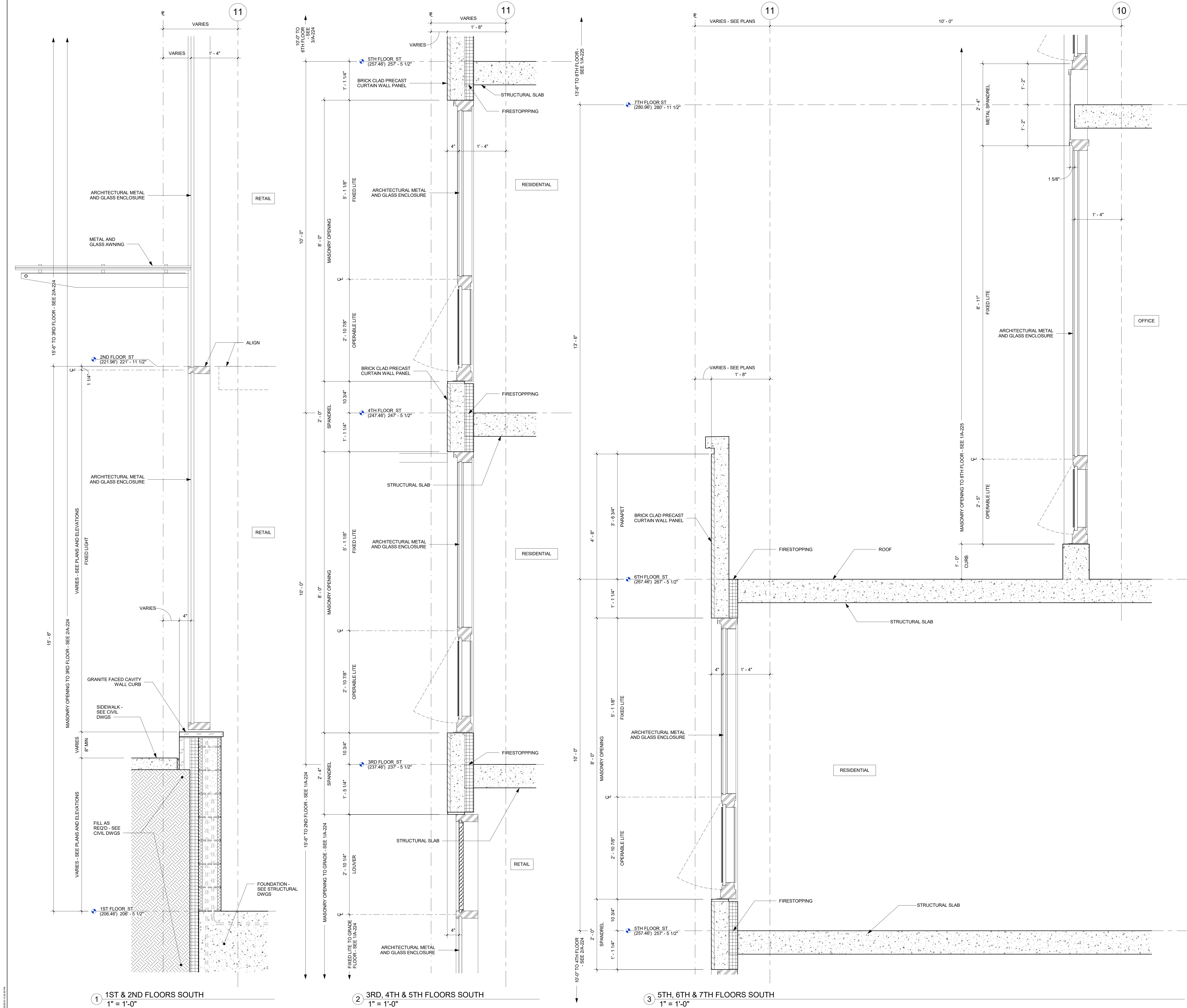
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| Project Number:<br><br><b>1317-01</b> | Signature & Seal |
| Drawn By:<br><br><b>Designer</b>      |                  |
| Checked By:<br><br><b>Checker</b>     |                  |
| Scale:<br><br><b>1" = 1'-0"</b>       |                  |
| Drawing Number:                       |                  |

A-223



[illegible]

|                 |                  |
|-----------------|------------------|
| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
| Checked By:     |                  |
| Checker         |                  |
| Scale:          |                  |
| 1" = 1'-0"      |                  |





**Burlington Town Center**  
**Devonwood Investors, LLC**

101 Cherry Street  
Burlington, VT 05401

|                 |                  |
|-----------------|------------------|
| Project Number: | Signature & Seal |
| 1317-01         |                  |
| Drawn By:       |                  |
| Designer        |                  |
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| Checker         |                  |
| Scale:          |                  |
| 1" = 1'-0"      |                  |

A-225



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|-----------------------------------|-------------------|
| Project Number:<br><b>1317-01</b> | Signature & Date: |
| Drawn By:<br><b>Designer</b>      |                   |
| Checked By:<br><b>Checker</b>     |                   |
| Date:<br><b>1" = 1'-0"</b>        |                   |

**Drawing:**







01 PERSPECTIVE VIEW — SW AERIAL VIEW  
NA



02 PERSPECTIVE VIEW — NE AERIAL VIEW  
NA

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| 1/11/2017  | 02  | P & Z RESUBMISSION 1 |
| 12/15/2016 | 01  | P & Z SUBMISSION     |
| Date       | No. | Description          |

Project

**Burlington Town Center,**  
**Devonwood Investors, LLC**  
101 Cherry Street  
Burlington, VT 05401

Drawing Title

**PERSPECTIVE VIEWS -**  
**AERIAL VIEWS**

Project Number

1317-01

Drawn By

Checked By

Scale

AS NOTED

Drawing Number

**A-401**

Drawing





01 PERSPECTIVE VIEW — CORNER OF CHERRY AND ST PAUL  
NA



02 PERSPECTIVE VIEW — CORNER OF CHERRY AND PINE  
NA



03 PERSPECTIVE VIEW — CORNER OF BANK AND ST PAUL  
NA

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Project

1/11/2017 02 P & Z RESUBMISSION 1

12/15/2016 01 P & Z SUBMISSION

Date No. Description

Project

Burlington Town Center,

Devonwood Investors, LL

101 Cherry Street

Burlington, VT 05401

Drawing Title

PERSPECTIVE VIEWS -

STREET VIEWS

Project Number

1317-01

Drawn By

Checked By

Date

AS NOTED

Drawing Number

A-402



# BURLINGTON TOWN CENTER BURLINGTON, VT



PLANNING & ZONING SUBMISSION

12/15/2016

**Revised 01/11/2017**



# **BURLINGTON TOWN CENTER PLANNING AND ZONING APPLICATION**

12/15/2016

**01/11/2017 Revised**

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1.0 OWNER, APPLICANT, AND DESIGN TEAM

2.0 NARRATIVE

3.0 EXISTING CONDITIONS PHOTOGRAPHS

4.0 SPECIFICATIONS

5.0 DEVELOPMENT ANALYSIS

6.0 MAJOR IMPACT NARRATIVE

7.0 MAJOR IMPACT REVIEW INTERDEPARTMENTAL CHECKLIST

8.0 LIST OF DRAWINGS

9.0 FIGURES

10.0 APPENDIX – DOWNTOWN MIXED USE CORE OVERLAY COMPLIANCE CHECKLIST



## 1.0 OWNER, APPLICANT, AND DESIGN TEAM

### 1.1 PLANNING AND ZONING APPLICATIONS REQUIRED:

- COA LEVEL II REVIEW APPLICATION
- MAJOR IMPACT REVIEW APPLICATION

### 1.2 OWNER:

|                              |              |
|------------------------------|--------------|
| Devonwood Investors, LLC     | Donald Sinex |
| 101 Cherry Street, Suite 440 |              |
| Burlington VT 05401          |              |
| 802-658-2545                 |              |

### 1.3 DESIGN TEAM:

|                               |                              |
|-------------------------------|------------------------------|
| Applicant/ Design Architect   | PKSB Architects              |
| Construction Management       | PC Construction              |
| Consulting Architect          | Freeman French Freeman, Inc. |
| Structural Engineer           | Hardy Structural Engineering |
| Mech./Elec./Plumbing Engineer | Hallam ICS                   |
| Civil Engineer                | Engineering Ventures         |
| Landscape Architect           | SE Group                     |
| Traffic, Noise, and Pollution | VHB                          |

### 1.4 NEIGHBORHOOD MEETING:

Per Zoning Section 3.5.2(b), pre-application neighborhood meetings were held. See FIGURE 1-A for affidavit, list of meeting dates, and meeting minutes.



## 2.0 NARRATIVE

### 2.1 PROJECT INTRODUCTION:

Devonwood Investors, LLC proposes to develop a multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District on the project site presently occupied by Burlington Town Center Mall at 49 Church Street. The site is currently spread across six parcels of land, and will be reconfigured into five, two of which will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul Street, between Cherry and Bank Streets (See Drawing C0.1 Adjusted Parcel Boundaries). The lot reconfiguration is a separate application. The proposed uses include retail, residential, office, and parking. The development consists of one building composed of a Base, a South Tower, and a North Tower.

### 2.2 DECONSTRUCTION (DEMOLITION) OVERVIEW:

Our limits of deconstruction will be framed by the existing street lines and building structures. Cherry Street will provide boundary to the North and Bank Street to the South. The 100 Bank Street building will anchor the southwest deconstruction limits and the Macy's building will provide terminus to the West. The L.L. Bean building and remaining mall structure will provide boundary to the East.

Site and building utilities will be cut and capped where serving the deconstruction areas and the project team will coordinate to maintain utilities for abutting properties. We will coordinate to ensure emergency egress and needs of all abutting properties are met throughout the course of construction.

As part of our LEED goals, we are seeking 75% or more diversion of recycled materials from the waste stream during the deconstruction process.

See Drawing AD-001 for drawing and photos.

### 2.3 DISTRICT SPECIFIC REGULATIONS: Zoning Section 4.5.8(c)1

Uses: Adjusted Parcel 2 is the lot bounded by Cherry, St. Paul, Bank, and Pine Streets exclusive of 100 Bank Street at the corner of Bank and Pine Streets. Square footage of Parcel 2 is 109,779. The total proposed square footage in subject Parcel 2 is 965,352, divided as follows:

|                          |                 |     |
|--------------------------|-----------------|-----|
| Retail:                  | 126,813 sf      | 13% |
| Office:                  | 230,328 sf      | 24% |
| Residential:             | 299,602 sf      | 31% |
| Residential Parking:     | 109,391 sf      | 11% |
| Non-Residential Parking: | 197,868 sf      | 21% |
| Public Amenity:          | <u>1,350 sf</u> | 0%  |
| TOTAL:                   | 965,352 sf      |     |

Per zoning section 4.5.8(c)1, the maximum allowed FAR is 9.5

$109,779 \times 9.5 = 1,042,900.5$  sf **Maximum allowed area.**

The proposed FAR for Adjusted Parcel 2 is:  $965,352 / 109,779 = 8.79$  **PROPOSED FAR.**



Building Height and Setbacks: Maximum building height per zoning section 4.5.8(c)1 is 160'-0". Proposed building heights comply with requirements, see drawing Z-021 Zoning Sections. Setbacks at street level are not required and not provided. Mechanical penthouses encroach beyond height limit no more than 15 feet, as allowed per Zoning Section 5.2.6(b) and are setback 10'-0" from the roof edge.

Pervious Area: Minimum required pervious area per zoning section 4.5.8(c)1 is 10%, or 10,978 square feet. Proposed pervious area to be **11,015** square feet, or **10.03%**. These "green" roofs will be in the North Tower on floors 7 and 12.

#### Floorplate Compliance Checklist

| Floors | Max Allowed |
|--------|-------------|
| 1-5    | 100% of Lot |
| 6-8    | 80% of Lot  |
| 9-12   | 55% of Lot  |
| 13     | 15,000 sf * |
| 14     | 15,000 sf * |

\* Each tower separated by 60'-0"

#### Floorplate Compliance Checklist - Proposed

| Floor | South Tower | Floor  | North Tower          |           | Total Coverage | % Lot Coverage |              |
|-------|-------------|--------|----------------------|-----------|----------------|----------------|--------------|
|       |             |        | East                 | West      |                |                |              |
| 1     | 84,795.60   | Cellar | 23,656.56 (Excluded) |           | 84,795.60      | 77.24%         | < 100%       |
| 2     | 85,488.59   | 1      | 22,954.26            |           | 108,442.85     | 98.78%         | < 100%       |
| 3     | 94,059.57   | 2      | 14,393.59            |           | 108,453.16     | 98.79%         | < 100%       |
| 4     | 94,058.57   | 3      | 14,392.59            |           | 108,451.16     | 98.79%         | < 100%       |
| 5     | 94,058.57   | 4      | 14,392.59            |           | 108,451.16     | 98.79%         | < 100%       |
| 6     | 18,077.06   | 5      | 53,241.62            |           | 71,318.68      | 64.97%         | < 80%        |
| 7     | 18,077.06   | 6      | 53,241.62            |           | 71,318.68      | 64.97%         | < 80%        |
| 8     | 18,077.06   | 7      | 33,977.74            |           | 52,054.80      | 47.42%         | < 80%        |
| 9     | 18,077.06   | 8      | 33,977.74            |           | 52,054.80      | 47.42%         | < 55%        |
| 10    | 14,475.33   | 9      | 33,977.74            |           | 48,453.07      | 44.14%         | < 55%        |
| 11    | 14,475.33   | 10     | 32,677.74            |           | 47,153.07      | 42.95%         | < 55%        |
| 12    | 11,905.74   | 11     | 32,677.74            |           | 44,583.48      | 40.61%         | < 55%        |
| Mec.  | 1,350.00    | 12     | 10,140.00            | 10,140.00 | 24,766.25      | 22.56%         | < 15,000 ea. |
|       |             | 13     | 10,140.00            | 10,140.00 | 20,280.00      | 18.47%         | < 15,000 ea. |
|       |             | 14     | 10,140.00            | 8,710.00  | 18,850.00      | 17.17%         | < 15,000 ea. |



## 2.4 URBAN DESIGN STANDARDS: Zoning Section 4.5.8(c)2 and Section 6.3.2(a)

Stepbacks are provided within 60'-0" of grade level and by 12<sup>th</sup> floor at all portions of the development, see Drawing Z-021 Zoning Sections. Upper story floorplates are split into reduced plates to provide tower-like proportions to allow views of the sky between individual building elements.

Projecting bay windows, recessed entryways, recessed balconies, spandrel panels, and brick offsets offer multiple surface relief in articulation of the facades of 4" or more at each facade. Primary material choices include brick, limestone-finished panels, and glass. Material changes are provided at upper story setbacks and other façade elements. Accent materials include metal railings and screens.

Setbacks provided are activated as outdoor amenities for tenants and visitors. The tops of the tower-like elements include columned structure with screened mechanical penthouses including all mechanical equipment (except for plumbing and shaft vents) setback from the façade. The columns also serve as support structure for an extensive photovoltaic array, providing power to the development. A 6" stone projection is provided at the roof level of the North Towers.

The lower stories, consisting of retail, parking, and residential uses, are visually differentiated from upper stories through material changes and setbacks. The upper stories are also differentiated with material changes and setbacks.

Multiple pedestrian access points are provided to buildings on all sides of the development and are typically setback 10'-0" from the main façade. The entry setbacks continue to the upper stories to create vertical expression, and are further expressed through canopies and signage.

### **Proposed Exterior Finish Materials**

|                           | Cherry St. | St. Paul St. | Bank St.   | Pine St.   |
|---------------------------|------------|--------------|------------|------------|
| Brick-Faced Panels        | 14,163 29% | 7,731 18%    | 1,978 6%   | 7,749 25%  |
| Limestone Finished Panels | 4,550 9%   | 5,485 13%    | 3,853 11%  | 4,796 15%  |
| Glazing                   | 21,824 45% | 25,410 58%   | 27,418 77% | 14,819 48% |
| Stone Base                | 266 1%     | 281 1%       | 161 1%     | 194 1%     |
| Metal Panels              | 7,755 16%  | 4,801 11%    | 2,083 6%   | 3,398 11%  |
| Total:                    | 48,558     | 43,708       | 35,493     | 30,956     |

For additional compliance information, see Zoning Ordinance Appendix.

## 2.5 RESIDENTIAL: Zoning Section 9.

Proposed residential units at the Cherry Street portion of the development are 242, distributed between floors 2-14. Proposed residential units at the Bank Street portion are 30, distributed between floors 2-4. The total quantity of proposed residential units is 272. Proposed units include 35 Studio apartments, 116 1-Bedroom apartments, and 121 2-Bedroom apartments.

Of the total 272 units, 55 (20.22%) are proposed to be Inclusionary apartments. The Inclusionary units are proportionally distributed amongst unit types and are evenly distributed throughout residential portions of the development. See Drawings A-051 – A-053.



## 2.6 RETAIL: Zoning Section 4.5.8(c)2C

Retail uses are proposed at street-level areas along all four street frontages, as well as second floors at Bank and St. Paul Streets. Approximately 75% of the retail facades consist of glazing to allow for prescribed display and visual requirements. See Elevations A201-A202 for specific percentages at each facade. Glazing allows transparency in order to provide window displays for tenants. Ground floor heights (floor to floor) are typically 15'-6", but vary per retail tenant space and meet or exceed 14'-0".

## 2.7 OFFICE:

Proposed office uses are located at floors 6-12 of the Bank Street (South) tower and at floors 5-6 of the Cherry Street (North) tower. See plan drawings.

## 2.8 PARKING: Zoning Section 4.5.8(c)4, Section 6.2.2(i,l), and Section 8

**The development commits to participate in the Downtown Parking and Transportation Management District.** Parking for tenants and visitors is provided at and above the second floor of the development on floors 2 through 5 of the South Tower. Vehicular parking access is provided on both Cherry and Bank Streets. Pedestrian access to parking area is provided at Cherry, Pine, and St. Paul Streets. Vehicles and headlights within the parking area are screened from public view with building façade elements consistent with the scale and materials of the overall development.

The total required number of automobile parking spaces is 733 (Zoning Section 8.1.8). See Table below. Total proposed number of automobile parking spaces is 761. Total proposed number of accessible parking spaces is 16, and all are provided at the lowest parking level.

An off-street loading area is proposed on Bank Street sharing the driveway with the off-street parking vehicular access.

Electric Vehicle Charging Stations are a component of the proposed parking use. See LEED checklist for more information.

### Car Parking Requirements

| Use                              | Required Base # | Ratio         | Required   | Proposed   |
|----------------------------------|-----------------|---------------|------------|------------|
| General Retail                   |                 | 0             | 0          | 0          |
| Office                           | 230,328 sf      | 2 per 1000 sf | 461        | 489        |
| Residential                      | 272 Units       | 1 per unit    | 272        | 272        |
| <b>Totals</b>                    |                 |               | <b>733</b> | <b>761</b> |
| Required Accessible Parking (2%) |                 |               | 15         | 16         |

Total required and proposed bicycle parking is 171. This is subdivided by 121 long term spaces and 50 (max required per Zoning Section 8.2.5) short term spaces. See table below. The long term spaces are located on floors 2-5 of the parking area, adjacent to the Pine Street parking pedestrian access and includes shower and changing facilities. Short term spaces are located at streetscape, adjacent to major entry points. See LA-200 Layout Plan.



**Bicycle Parking Requirements**

| Use            | Required<br>Base # | Long Term       |        | Short Term      |        |
|----------------|--------------------|-----------------|--------|-----------------|--------|
|                |                    | Ratio           | Spaces | Ratio           | Spaces |
| General Retail | 126,813 sf         | 1 per 20,000 sf | 7      | 1 per 5,000 sf  | 26     |
| Office         | 230,328 sf         | 1 per 5000 sf   | 46     | 1 per 10,000 sf | 23     |
| Residential    | 272 Units          | 1 per 4 units   | 68     | 1 per 10 units  | 27     |
| Sub-Total      |                    | 121             |        | 50 (Max Req'd)  |        |
| Required Total |                    |                 |        | 171             |        |

**2.9 PUBLIC AMENITY:**

A public observation deck is located on the 13<sup>th</sup> floor of the Bank Street (South) tower consisting of an enclosed observation area and an exterior deck. Public access is via the Bank Street Office entry point.

**2.10 SIGNS:** See Zoning Sections 4.5.8(c)5 and Section 7.

Signs shall be submitted for review under a separate permit application. Any signs shown in the drawings or renderings are generic in nature and do not necessarily represent actual signage to be proposed.

**2.11 GREEN BUILDING:** Zoning Section 4.5.8(c)6

This project is required to meet a LEED Gold Standard as part of the zoning changes for the Downtown Core Mixed Use Overlay district that were approved by Burlington voters. The project will pursue certification under the “LEED v4 for New Construction and Major Renovations” rating system.

See FIGURE 2-A for a Summary LEED Checklist per Zoning Section 5.4.8(c)6A. This checklist illustrates the most straightforward path to the 60 points required for certification at the Gold level. It is of a schematic nature at this time and is subject to change based on design adjustments over the course of the project and may take a significantly different path to certification.

FIGURE 2-B is the receipt offered as proof that the project has been registered with the US Green Building Council. The project ID is 1000097092 and the project should be listed at <http://www.usgbc.org/projects> by the time this application is submitted.

The project team hereby commits to pursuing pre-certification at the earliest appropriate milestone. The ability to pre-certify projects registered for the “New Construction and Major Renovations” version of LEED has not been available in the past, but a precertification option applicable to this project was announced on December 1, 2016. The precertification worksheet requires specific details about the project to be provided to the LEED certification body, such as mechanical equipment schedules, plumbing fixture data, and other details which will not be determined until the design has progressed substantially, although the LEED checklist provided with this application indicates the level of performance we intend to pursue. <http://www.usgbc.org/articles/new-precertification-options-launched-leed-v4-bdc-and-om-projects>



We note that the LEED process is rigorous and that our team's experience indicates that for a project of this size and complexity, it generally takes a year following final completion of the project to submit the extensive documentation required for formal review by GBCI, the official certifying body for LEED. While precertification will provide written feedback from the reviewing body early in the design process, we anticipate final certification will occur in the summer of 2021, based on the proposed schedule's final completion in May, 2020,

Freeman French Freeman will coordinate the LEED submission and has successfully facilitated the LEED certification of 10 projects, 5 of them at the Gold level. Among them are the Community Health Centers of Burlington (LEED Certified); UVM University Heights (LEED Gold); UVM Jeffords Hall (LEED Gold). FFF has a further 5 projects with LEED certification pending.

## 2.12 STORMWATER MANAGEMENT: Zoning Section 4.5.8(c)6B

The existing site is composed almost entirely of impervious areas. Runoff from the existing site discharges directly and without treatment or attenuation to the combined sewer system. The runoff from the site is treated at the Burlington Main Municipal Wastewater Treatment plant. Each year, for most storms runoff from the existing site is fully treated at the wastewater treatment plant. However, several times each year during larger storm events, the Main Municipal Wastewater Treatment plant is hydraulically overloaded. Therefore, there are opportunities to implement improved runoff reduction practices for the site in accordance with Section 4.58(c)6B of the Downtown Mixed Use Core Overlay Regulations. The following opportunities are considered:

- Separating stormwater flows from sanitary sewer flows to allow onsite attenuation. Onsite, rainwater will be collected through a system that is separate from the sanitary sewer system. Prior to leaving the site, rainwater will be stored and attenuated in 3 large underground water cisterns. These subsurface tanks will reduce the runoff from the site for all storms when compared to current conditions. The rate of runoff will be reduced so that during a 1-year 24-hour storm the peak stormwater rate flows from the site at a rate less than the peak runoff rate from a meadow in good condition. Smart flow meter technology will be integrated for DPW's use to provide effective flow rates optimized to the main wastewater treatment plants needs across a variety of storms hydrographs.
- Stormwater Reuse through a greywater toilet or irrigation system is not appropriate to implement for this site. This site is a mixed-use development containing retail and residential bathrooms, medical office uses, and daycare facilities where a greywater reuse system is not feasible due to the future flexibility of uses in the building. Also, Vermont's climate does not require the use of irrigation systems.
- Green Roofs will be provided on a minimum of 10% of the proposed building, designed to capture and attenuate the first 1" of rainfall. The location of the green roofs will take into account solar shading of the terraced roof's and structural framing systems.
- Bioretention areas need to be located in topographically flat areas with deep well-draining soil, that receive runoff from areas that are protected from sedimentation. A bioretention area is proposed along a portion of the north side of Bank Street. The bioretention area will be located at the lower end of the street where a parking-bump-out occurs so that the bioretention area



has enough width so that the appropriate vegetation can survive winter conditions and a pretreatment device can be provided.

- All of the sidewalks surrounding the site will have some pervious paver areas, street trees and landscaping that will reduce the runoff of stormwater through infiltration and evapotranspiration.
- The appropriateness of infiltrating stormwater requires the evaluation of subsurface conditions. Prior to implementing stormwater infiltration measures, the following items must be evaluated during construction because a building currently occupies the site: existing soil contamination; structural bearing capacity of saturated soils; water infiltration into basements and subsurface structures including buildings that surround the site; existing and proposed depth to ledge rock; existing and proposed groundwater elevations; and the ability to maintain effective pretreatment facilities where needed.

See Drawings C1.6 and C3.4 for Erosion Prevention Sediment Control Plan, Details and Notes.

#### 2.13 OUTDOOR LIGHTING: Zoning Section 5.5.2

The intent of exterior lighting is to minimize light pollution while providing safe and inviting streetscapes for pedestrians and retail activities. Sidewalk lighting for pedestrians will be wall-mounted downlights mounted at brick piers at either side of the main entries. Additional lighting at main entry points to the development will be by canopy-mounted downlights. See specifications and LA-500 Lighting/ Photometric Plan.

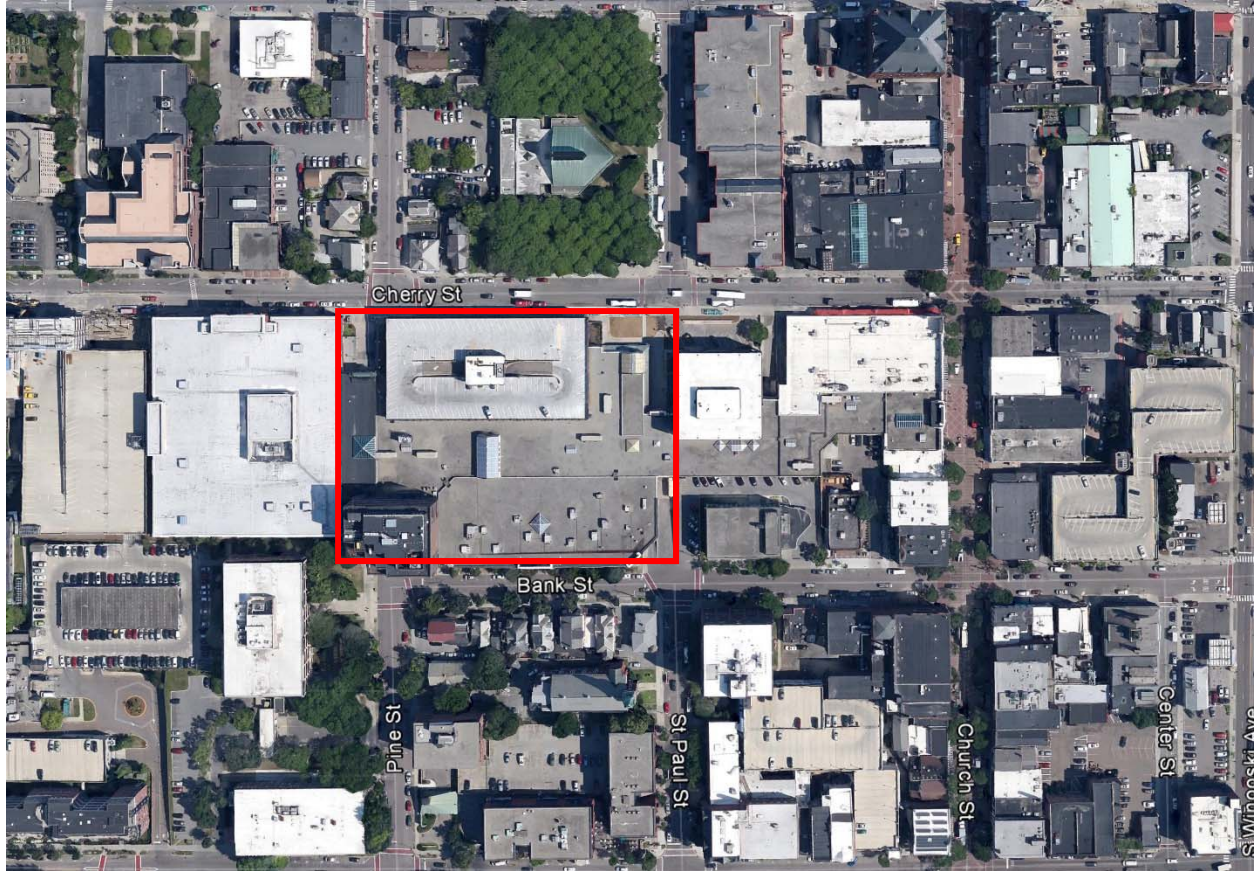
#### 2.14 ADJUSTED PARCEL 2 COVERAGE CALCULATION: (See Proposed Site Plan for more info)

**Proposed:**

|                             |                           |
|-----------------------------|---------------------------|
| Building (Non-Pervious):    | 97,122 sf                 |
| Pavement:                   | <b>1,642</b> sf           |
| Pervious Area (Green Roof): | <b>11,015</b> sf          |
| Total:                      | 109,779 sf                |
| Lot Size:                   | 109,779 sf                |
| Proposed Coverage:          | $109,779/109,779 = 100\%$ |



### 3.0 EXISTING CONDITIONS PHOTOGRAPHS

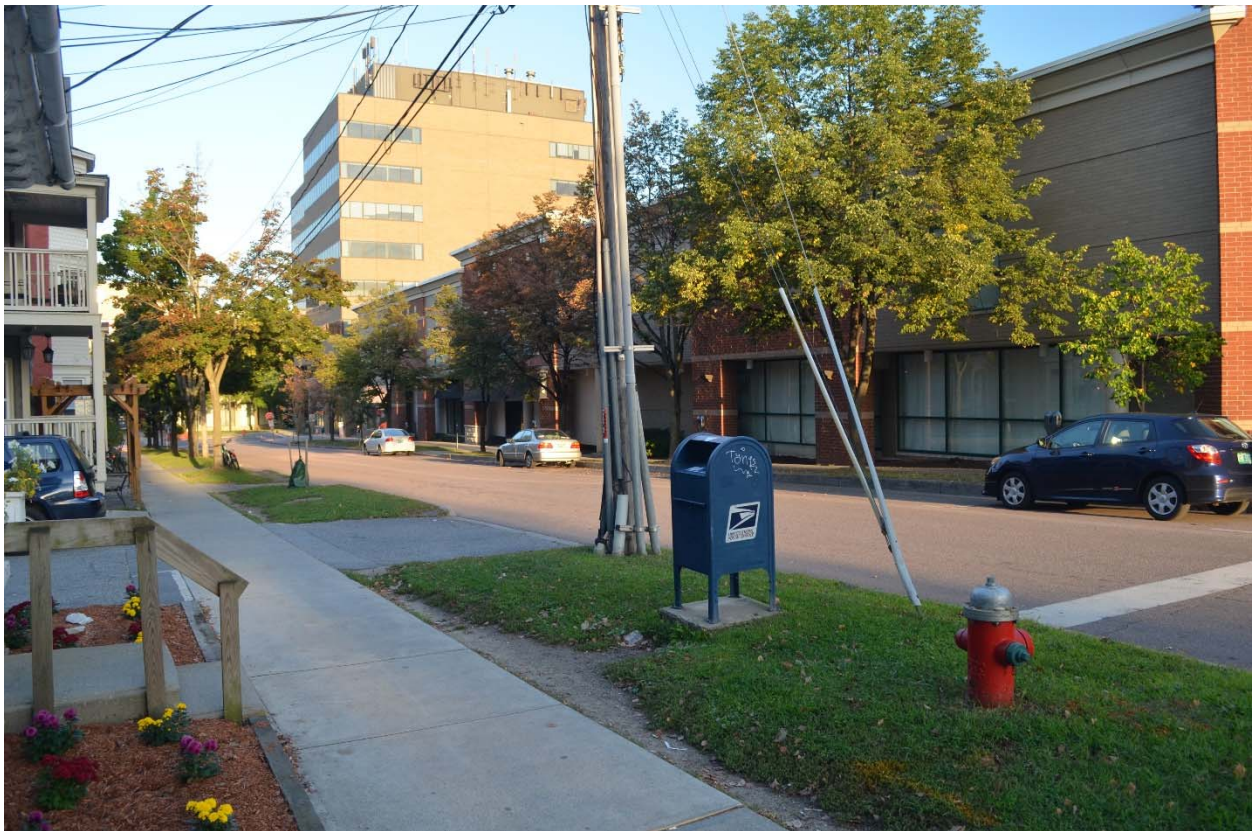


### 3.1 AERIAL VIEW OF DEVELOPMENT SITE





3.2 BANK STEET - LOOKING WEST

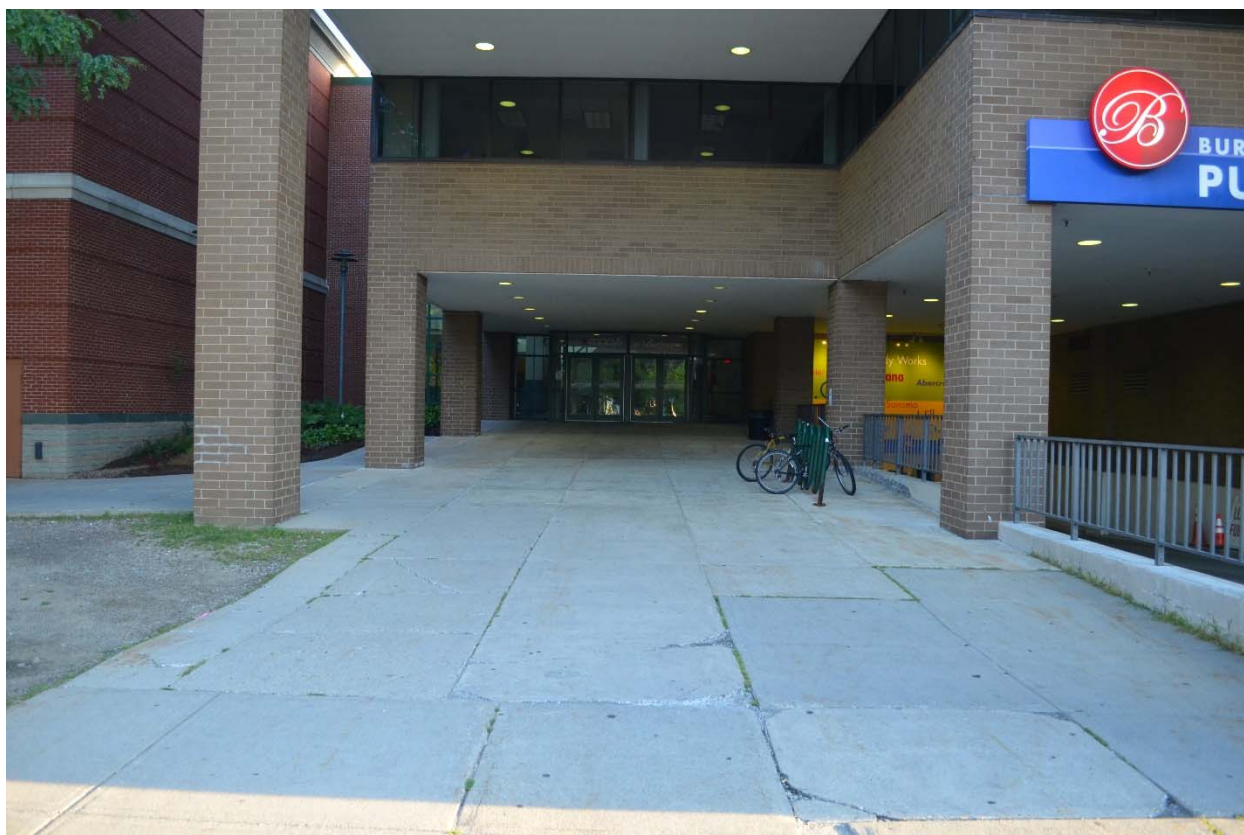


3.2 BANK STREET - LOOKING NORTHWEST





### 3.3 CORNER OF BANK STREET AND PINE STREET – LOOKING NORTHEAST



### 3.4 PINE STREET AT BANK STREET – LOOKING NORTH





3.5 CHERRY STREET – LOOKING SOUTHWEST



3.6 CHERRY STREET - LOOKING WEST





3.7 CHERRY STREET - LOOKING SOUTHEAST



3.8 PINE STREET AT CHERRY STREET - LOOKING SOUTH





3.9 CHERRY STREET – LOOKING EAST



3.10 CHURCH STREET – LOOKING SOUTHWEST



## 4.0 SPECIFICATIONS

### SITEWORK

- Concrete Sidewalk See LA-400
- Deciduous Street Trees
- Storm Drainage Retention System
- Bicycle Rack (Short Term) See LA-200
- Electric Vehicle Charging Station
- Street Light See FIGURE 4-O

### BUILDING FAÇADE

- Brick-Faced Panels See FIGURE 4-A
- Limestone Finished Panels See FIGURE 4-B
- Aluminum Storefront and Entrance Doors See FIGURE 4-C
- Aluminum Windows (Upper floors) See FIGURE 4-D
- Aluminum Panels See FIGURE 4-E
- Painted Metal and Stainless Steel Cable Railing See FIGURE 4-F
- Glass Canopies See FIGURE 4-G
- Exterior Wall-mounted Lighting Fixtures See FIGURE 4-H
- Exterior Canopy-Mounted Light Fixtures See FIGURE 4-I

### ROOF AREAS

- Pre-cast Concrete Pavers See FIGURE 4-J
- Porous Pavement See FIGURE 4-K
- Fluid-Applied Membrane Roofing See FIGURE 4-L
- Green Roof See FIGURE 4-M
- Photovoltaic Panels See FIGURE 4-N



## 5.0 DEVELOPMENT ANALYSIS

### 5.1 DAYS AND HOURS OF OPERATION:

#### **Days and Hours of Operation**

| Component         | Days        | Hours        | Notes                                        |
|-------------------|-------------|--------------|----------------------------------------------|
| Retail            | 7 days/week | 9am-9pm      | <i>Extended hours during holiday periods</i> |
| Office            | M-F         | 7am-6pm      |                                              |
| Residential       | 7 days/week | 24 hours/day |                                              |
| Parking Structure | 7 days/week | 24 hours/day |                                              |

### 5.2 NUMBER OF EMPLOYEES:

Number of employees is estimated to be 50.

### 5.3 TRAFFIC GENERATION AND PARKING ANALYSIS: See FIGURE 5-A.

### 5.4 PHASING SCHEDULE: See FIGURE 5-B.

### 5.5 NOISE: See FIGURE 5-C.

The proposed project would not result in adverse noise impact as it relates to the Burlington Noise Code (Section 21-13). The project would not be expected to include specific noise generating activities which are prohibited according to the Noise Code.

The development will include retail and office uses similar in nature and character to existing uses on the site and on abutting parcels typical of the downtown. Parking, loading docks, and trash and recycling facilities are partially enclosed within the building which would improve current conditions. The outdoor fifth floor tenant park will only be accessible to office tenants and the pre-kindergarted program during normal business hours. Standard mechanical equipment will be located on the building roofs and would be enclosed which would substantially reduce noise to the community.

### 5.6 ARCHEOLOGICAL IMPACTS:

The development is located entirely within a site previously disturbed during the urban renewal projects that resulted in excavation, disturbance and removal of soils to a depth below anticipated features of archeological significance. Based on this and a review with Planning and Zoning Staff and archeological professionals, it has been determined that the site does not require any further study.



## **6.0 MAJOR IMPACT NARRATIVE** pursuant to Zoning Section 3.5.6(b):

- 6.1 The project will not result in undue water, air or noise pollution. Currently, most or all of the stormwater runoff from the site is discharged untreated to the City of Burlington combined sewer and stormwater collection system which is conveyed to the Main Wastewater Treatment Plant for treatment. The proposed project will manage stormwater runoff via filtering through a green roof (for a portion of the project roof), streetscape stormwater treatment features (such as pervious pavers and vegetated filtration planters) and attenuated storage in below grade stormwater cisterns prior to discharge to the municipal system, thus improving the quality and reducing the rate of stormwater discharge from the project site. Sanitary sewage from the project will be discharged to the municipal system and conveyed to the Main Wastewater Treatment Plant for treatment. Coordination with the Burlington Department of Public Works is ongoing to configure discharge locations around the project based on municipal capacity. Proposed mechanical equipment and additional parking within the project will not result in undue additional air pollution.

Refer to Section 5.5 Development Analysis above and FIGURE 5-C for a summary of anticipated noise pollution.

Refer to FIGURE 6-A for Contractor Dust Mitigation Control Measures.

- 6.2 The anticipated increase in domestic water demand for this project (in addition to existing domestic water demand) is roughly 100,000 gallons per day. Coordination with the Burlington Department of Public Works has indicated that there is sufficient reserved water supply available for this project. In addition, adequate flow and pressure for fire suppression is available.
- 6.3 The project site is bounded by municipal waterlines to the north and south and a new municipal waterline is proposed in the new section of Saint Paul Street to the east. This new line will improve the downtown distribution system connectivity. The proposed project does not unreasonably burden the city's present or future water supply or distribution system.
- 6.4 The existing site is essentially 100% covered with impervious surface (building, concrete and asphalt). The proposed site is similarly covered with impervious surface with the addition of a green roof and pervious pavers around the perimeter of the site. Neither existing nor proposed site conditions will cause unreasonable soil erosion or reduce capacity of the land to hold water. During construction, standard urban erosion control measures will be administered including perimeter silt fencing where appropriate, inlet protection, stone construction entrances, temporary sedimentation basins, filtered dewatering and street sweeping as necessary. In general, the majority of the site will be excavated below surrounding grades by several feet during foundation work and, once grades met, stabilized with crushed stone and eventually concrete. Due to the downtown location, there will be minimal soil stockpiling for extended durations.
- 6.5 The Burlington Town Center project is not expected to generate unreasonable congestion or unsafe conditions within Burlington's transportation system. As demonstrated in the project's Traffic Impact Study, the City of Burlington's existing grid street network, transit facilities, sidewalk



network, and bicycle facilities can adequately accommodate the additional trips generated by the proposed Burlington Town Center project. The project is located in the downtown core of Burlington, surrounded by a dense network of sidewalks and bicycle amenities and directly across the street from the recently completed Green Mountain Transit Downtown Transit Center. The proximity and availability of these amenities will result in a significant number of site-generated trips occurring by non-automobile mode (e.g. by foot, by bicycle, and by bus). A number of the likely Town Center tenants are active participants in the Chittenden Area Transportation Management Association (CATMA), an organization that partners with employers and employees to reduce single occupant vehicle trips. The density and mix of uses proposed for the project will likely result in a number of trips occurring entirely within the Town Center (e.g. apartment to daycare or office to restaurant), and thus not impacting the adjacent street network. An important aspect of the project is the proposed construction of Pine Street and St. Paul Street between Bank Street and Cherry Street to restore the City's street grid in this area. In addition to improving overall downtown connectivity, the new blocks of Pine Street and St. Paul Street will enhance bus accessibility from the Downtown Transit Center and create new routes for existing cross-town trips, thereby reducing overall delay on parallel north-south streets including Battery Street and South Winooski Avenue. New traffic signals are proposed at the Pine Street/Cherry Street, Pine Street/Bank Street, and St. Paul Street/Cherry Street (integrated with Downtown Transit signals) which will accommodate both site-generated trips, newly re-routed cross-town trips, and buses departing from the Downtown Transit Center.

- 6.6 The Burlington School District 2015 Annual Report listed total enrollment of 3,975. A letter from the Burlington School Department dated February 5, 2004 regarding proposed housing at the nearby Battery and Cherry Street developments estimated 0.127 school age students per 2-bedroom unit based on a 1990 Cannon Associates report. A 2007 report from VHFA titled Housing and Vermont School Enrollment estimated 0.13 school aged children per "attached" 2-bedroom unit and 0.18 school aged children per 2-bedroom unit in buildings with 2-4 units. Based on these documents, a value of 0.15 school aged children per 2-bedroom unit is assumed for this development. There are 272 units of housing proposed for this development with a mix of 35 studios, 116 1-bedroom and 121 2-bedroom units. Assuming no school age children in the studios and 1-bedroom units, an estimated number of school age children in this development is 18.15. This represents less than ½% of the current enrollment and should not cause an unreasonable burden on the city's ability to provide educational services.
- 6.7 Not place an unreasonable burden on the city's ability to provide municipal services; A technical review meeting was convened with municipal departments on January 14, 2016 to review the project and the city's ability to provide municipal services. Based on input at the meeting there was not indicated that the project would place an unreasonable burden on the city's ability to provide municipal services. Coordination with municipal departments has been ongoing to address technical review comments. Ability to service letters will be requested from municipal departments as necessary.
- 6.8 The project will not have an undue adverse effect on the features noted above. There are no irreplaceable or significant natural areas located on the project site. The existing structures proposed to be demolished for the project were constructed during the period of urban renewal and are all less than 50 years old and no considered historic. As noted in Section 5.6 Archeological



Impacts above, the site was previously disturbed during the urban renewal redevelopment and no significant archeological features are anticipated to have survived. The project will be visible from locations throughout the city, however the size, massing and materials will meet the Downtown Mixed Use Core Overlay regulations and not have an undue adverse effect on the scenic or natural beauty of the area or any part of the city.

- 6.9 The project will not have an undue adverse effect on the city's growth, fiscal capability or public services and facilities. The project meets many of the initiatives identified in planBTV and the city municipal development plan in support of appropriate growth in the city and increased tax base revenue to support public services and facilities.
- 6.10 The project is in substantial conformance with the city's Municipal Development Plan adopted March 31, 2014, planBTV Downtown and Waterfront plan adopted June 10, 2013, the Housing Action Plan, the Great Streets Initiative, the Climate Action Plan and the Legacy Action Plan and the 2013 College Street StormwaterShed Retrofits Green Infrastructure Plan. Specific goals of the of the 2014 Municipal Development Plan supported by this project include; Strengthen the City Center District (CCD) with higher density, mixed-use development as part of the regional core while ensuring that it serves the needs of city residents, particularly those in adjacent neighborhoods. Target new and higher density development into the Downtown, Downtown Waterfront, Enterprise District, Institutional Core Campuses, and the Neighborhood Activity Centers. Enhance the City's gateways and streetscapes. Enhance the pedestrian experience by improving opportunities for pedestrian access and interaction throughout the city. Promote and strengthen a mixed economy, and work actively to retain existing businesses and jobs. Invest in the necessary public improvements, particularly transportation, to strengthen the Downtown, both as a Regional Growth Center, and as city neighborhood. Encourage a healthier regional balance of affordable housing in each community, proximate to jobs and affording mobility and choice to low income residents. Support the development of additional housing opportunities within the city, with concentrations of higher density housing within neighborhood activity centers, the downtown and institutional core campuses.
- 6.11 A major component of the Burlington City Center project is to provide a significant number of new housing units. The project as currently planned contains a total of 272 units. There are 121 2-Bedroom apartments, 116 1-Bedroom apartments, and 35 studio apartments out of which 55 units (24 2BRs, 24 1BRs, & 7 studios) will be permanently affordable. In October 2016, the Allen & Brooks Northwest Vermont Market Report showed a 2.1% rental vacancy rate in Chittenden County, well below the national average of 4.4%. While the project will add both retail and office jobs, that increase will be incremental when compared to jobs at the existing mall use on this site. The 272 units will likely house upwards of 500 people, and mark a significant increase in the population and availability of housing in our downtown core. There is a particularly high demand for housing within the City of Burlington, and PlanBTV notes that downtown housing is in particularly short supply (p60) and has impacted the ability of local business to attract an educated workforce. The PlanBTV report cites the mall site as one of two "ideal locations" for new downtown housing (p62). In focusing on the mall, the report states, "With underdeveloped air space above the mall, and a relatively high and flat area of the City that has little impact on prominent views, this quadrant of downtown is well suited for larger residential structures" (p108). In short, a primary goal of this project is to provide housing in a location that has been



identified by citizens and planners as having a high demand for housing and a high potential for redevelopment.

- 6.12 The project helps to fulfill several goals of Burlington's Plan BTV Downtown and Waterfront Document that are outlined on By facilitating the re-opening of portions of St. Paul and Pine Streets that were subsumed into the urban renewal "superblock", the project facilitates movement through downtown, removing barriers to north-south travel, and providing new "complete streets" that include wide sidewalks, street trees, and street furniture, and support for multiple modes of transportation while focusing on a pedestrian experience. The project will help enliven the area just north of City Hall Park and improve the experience of Cherry Street. By enhancing the street life in the area around the mall, the project will enhance the connection between Church Street and Waterfront Park. The project will also include a rooftop observatory, green roof spaces, and street-level outdoor spaces that could provide additional space for popular events such as the Discover Jazz Festival. A day care facility planned for the site will help meet a clear need for childcare. The increased density of the project will bring more residents and office workers to downtown areas that are well served by existing parks facilities- but at the same time, the project will give back street space to the public and enhance the aesthetics and experience of existing streets. Please also refer to FIGURE 6-A letter of support from the Department of Parks and Recreation, and Waterfront.



## **7.0 MAJOR IMPACT REVIEW INTERDEPARTMENTAL CHECKLIST**

Request for impact review letters will be sent to each department below:

- Department of Public Works for written input on municipal water and sewer needs, stormwater management, erosion control, and traffic impacts.
- Department of Parks and Recreation for written input on park and recreation needs.
- School Department for written input on educational impacts.
- Fire Department for written input on anticipated fire and emergency response impacts.
- Police Department for written input on anticipated police service impact.





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December 7, 2016

Burlington Schools  
150 Colchester Avenue  
Burlington, VT 05401  
Att: Yaw Obeng  
Superintendent of Schools  
[superintendent@bsdvt.org](mailto:superintendent@bsdvt.org)

Dear Mr. Obeng:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2.

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. We are writing to introduce you to the project and review aspects of the project related to educational services. In accordance with section 3.5.6(b)6 of the zoning ordinance, we would like to have you determine that the project, "Not cause an unreasonable burden on the city's ability to provide educational services".

To help you with evaluating this statement we have compiled the following data. The Burlington School District 2015 Annual Report listed total enrollment of 3,975. A letter from the Burlington School Department dated February 5, 2004 regarding proposed housing at the nearby Battery and Cherry Street developments estimated 0.127 school age students per 2-bedroom unit based on a 1990 Cannon Associates report. A 2007 report from VHFA titled Housing and Vermont School Enrollment estimated 0.13 school aged children per "attached" 2-bedroom unit and 0.18 school aged children per 2-bedroom unit in buildings with 2-4 units.

Based on these documents, a value of 0.15 school aged children per 2-bedroom unit is assumed for this development. There are 272 units of housing proposed for this development with a mix of 35 studios, 116 1-bedroom and 121 2-bedroom units. Assuming no school age children in the studios and 1-bedroom units, an estimated number of school age children in this development is 18.15. These 18 children would represent less than one-half of one-percent (0.5%) of the current enrollment and should not cause an unreasonable burden on the city's ability to provide educational services.

If you have any questions or need additional information, please let us know.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', is written over a horizontal line.

Kevin Worden, P.E.  
Vice President

Cc: Donald Sinex [dsinex@devonwoodinvestors.com](mailto:dsinex@devonwoodinvestors.com)



December 7, 2016

City of Burlington  
Department of Public Works  
645 Pine Street Suite A  
PO Box 849  
Burlington, VT 05402-0849  
Att: Chapin Spencer  
Director of Public Works  
[cspencer@burlingtonvt.gov](mailto:cspencer@burlingtonvt.gov)

Dear Mr. Spencer:

Thanks for your and your department's previous input on the multi-use project proposed by Devonwood Investors, LLC within the Downtown Mixed Use Core Overlay (DMUC) District. As you know, the purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2

A technical review meeting was convened with municipal departments on January 14, 2016 to review the project and the city's ability to provide municipal services. Based on input at the meeting there was no indication that the project would place an unreasonable burden on the city's ability to provide municipal services. Coordination with municipal departments has been ongoing to address technical review comments.

To summarize the projects estimated demands, there will be an anticipated increase in domestic water demand (in addition to existing domestic water demand) around 100,000 gallons per day. Our previous coordination with the Burlington Department of Public Works has indicated that there is sufficient reserved water supply available for this project.

The project site is bounded by municipal waterlines to the north and south and a new municipal waterline is proposed in the new section of Saint Paul Street to the east. This new line will improve the downtown distribution system connectivity. As the project moves forward, Site Development and Construction Plans will be finalized to provide final construction level details as is necessary.

At this time, to address the initial criteria of a Zoning Permit accordance with section 3.5.6(b) we would like to have you determine that the project:

- Has sufficient water available for its needs



- Not unreasonably burden the city's present or future water supply or distribution system
- Not cause unreasonable congestion or unsafe conditions on highways, streets, waterways, railways, bikeways, pedestrian pathways or other means of transportation, existing or proposed
- Not place an unreasonable burden on the city's ability to provide municipal services, as related to the services that the Department of Public Works provides.

If you have any questions, please call our office.

Sincerely,



Kevin Worden, P.E.  
Vice President

Cc: Donald Sinex

[Dsinex@devonwoodinvestors.com](mailto:Dsinex@devonwoodinvestors.com)





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December 7, 2016

Burlington Fire Department  
Office of the City Fire Marshal  
132 North Avenue  
Burlington, VT 05401

Att: Barry J. Simays  
Burlington Fire Marshal  
[bsimays@burlingtonvt.gov](mailto:bsimays@burlingtonvt.gov)

Dear Barry:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. The project will be designed to meet the requirements of the appropriate Vermont Building Codes, including relevant NFPA Codes, to provide adequate fire protection and emergency medical services to the property. As the Authority Having Jurisdiction, building plans will be submitted to your office for review of all proposed building construction during the Building Permit process.

At this time, to address the initial criteria of a Zoning Permit, we are writing to introduce you to the project, review site and zoning related aspects of the project, and incorporate your input in to the Zoning Permit plans. In accordance with section 3.5.6(b)7 of the zoning ordinance, we would like to have you determine that the project, "Not place an unreasonable burden on the city's ability to provide municipal services" as related to fire and emergency medical services.

Please give me a call at your convenience and we would be happy to meet with you to orient you to the proposed project and receive your feedback.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', is written over a light blue horizontal line.

Kevin Worden, P.E.  
Vice President  
Cc: Donald Sinex

[Dsinex@devonwoodinvestors.com](mailto:Dsinex@devonwoodinvestors.com)





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December 7, 2016

City of Burlington  
Department of Parks and Recreation  
645 Pine Street Suite 8  
Burlington, VT 05401  
Att: Jesse Bridges  
Director of Parks and Recreation  
[jbridges@burlingtonvt.gov](mailto:jbridges@burlingtonvt.gov)

Dear Jesse:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2.

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. We are writing to introduce you to the project and review aspects of the project related to park and recreational facilities. In accordance with section 3.5.6(b)(12) of the zoning ordinance, we would like to have you determine that the project will, "not have an undue adverse impact on the present or projected park and recreation needs of the city." The proposed location of the project is within the proximity of several existing park and recreational facilities.

If you have any questions or would like further information about the project, please let us know.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', is written over a light blue horizontal line.

Kevin Worden, P.E.  
Vice President

Cc: Donald Sinex [DSinex@devonwoodinvestors.com](mailto:DSinex@devonwoodinvestors.com)





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December 7, 2016

Burlington Police Department  
One North Avenue  
Burlington, VT 05401  
Att: Brandon del Pozo  
Chief of Police  
[bdelpozo@bpdvt.org](mailto:bdelpozo@bpdvt.org)

Dear Chief del Pozo:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2.

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. We are writing to introduce you to the project and review aspects of the project related to Police services. In accordance with section 3.5.6(7) of the zoning ordinance, we would like to have you determine that the project, "not place an unreasonable burden on the city's ability to provide municipal services" as related to police services.

The intent of exterior lighting is to minimize light pollution while providing safe and inviting streetscapes for pedestrians and retail activities. Sidewalk lighting for pedestrians will be wall-mounted downlights mounted at brick piers. Lighting at main entry points to the development will be by canopy-mounted downlights

Please let us know if you have any questions or need additional information about the site as it relates to police services.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', with a stylized flourish at the end.

Kevin Worden, P.E.  
Vice President

Cc: Donald Sinex      [Dsine@devonwoodinvestors.com](mailto:Dsine@devonwoodinvestors.com)





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December 14, 2016

Burlington Electric Department  
Attn: Neale Lunderville  
585 Pine Street  
Burlington, VT 05401

Dear Mr. Lunderville:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. At this time, to address the initial criteria of a Zoning Permit, we are writing to introduce you to the project, review site and zoning related aspects of the project, and incorporate your input in to the Zoning Permit plans.

In accordance with section 3.5.6(b)9 of the zoning ordinance, we would like to have you determine that you have the ability to serve the project and that it does "not have an undue adverse effect on the city's investment in public services and facilities," as related to your electrical facilities.

I have attached the 12/13/2016 Electrical Load Prediction Summary, prepared by William E Neuburger, PE, Director of Engineering, Hallam-ICS indicating the Electrical Load at 2 MVA.

If you have any questions or would like further information about the project, please let us know.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', is written over a light blue horizontal line.

Kevin Worden, P.E.  
Vice President

Cc: Donald Sinex [Dsinex@devonwoodinvestors.com](mailto:Dsinex@devonwoodinvestors.com)  
William Neuburger, P.E. [bneuburger@hallam-ics.com](mailto:bneuburger@hallam-ics.com)





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December 14, 2016

Burlington Telecom  
Attn: William DuShane  
200 Church Street  
Burlington, VT 05401

Dear William:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. At this time, to address the initial criteria of a Zoning Permit, we are writing to introduce you to the project, review site and zoning related aspects of the project, and incorporate your input in to the Zoning Permit plans.

In accordance with section 3.5.6(b)9 of the zoning ordinance, we would like to have you determine that you have the ability to serve the project and that it does "not have an undue adverse effect on the city's investment in public services and facilities," as related to your telecom facilities.

If you have any questions or would like further information about the project, please let us know.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', is written over a light blue horizontal line.

Kevin Worden, P.E.  
Vice President  
Cc: Donald Sinex

[Dsinex@devonwoodinvestors.com](mailto:Dsinex@devonwoodinvestors.com)





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December 13, 2016

Dale Lavalley  
Vermont Gas  
P.O. Box 467  
Burlington, VT 05402

Dear Dale:

A multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District is proposed by Devonwood Investors, LLC. The purpose of this project is to redevelop the project site presently occupied by Burlington Town Center Mall. The proposed uses include retail, residential, office, and parking with a total proposed square footage of 949,506. In addition, two of the reconfigured parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets. We have included the following Plans for your reference: Existing Conditions C1.0, Demolition Plan C1.1; and Site Plan C1.2

The applicant is in the process of applying to the City of Burlington for a Planning and Zoning Permit. At this time, to address the initial criteria of a Zoning Permit, we are writing to introduce you to the project, review site and zoning related aspects of the project, and incorporate your input in to the Zoning Permit plans.

In accordance with section 3.5.6(b)9 of the zoning ordinance, we would like to have you determine that the project, "Not have an undue adverse effect on the city's investment in public services and facilities."

I have attached the Natural Gas Load Estimated Summary, prepared by William E Neuburger, PE, Director of Engineering, Hallam-ICS indicating the Natural Gas Load at 17 million btu/hour.

If you have any questions or would like further information about the project, please let us know.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kevin Worden', is written over a horizontal line.

Kevin Worden, P.E.  
Vice President

Cc: Donald Sinex [Dsinex@devonwoodinvestors.com](mailto:Dsinex@devonwoodinvestors.com)  
William Neuburger, P.E. [bneuburger@hallam-ics.com](mailto:bneuburger@hallam-ics.com)



December 13, 2016

John Haselbauer  
PKSB Architects, PC  
330 West 42 Street  
New York, NY 10036

Re: Burlington Town Center

Greetings John:

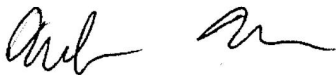
Attached are the electric and gas load projections we have provided for the above captioned project.

The predictions strike a balance between code required values for planning and an expectation the project building will be high performance.

The details are shown in the proceeding pages. In summary, the electric demand prediction is 1,985 kVA and the gas demand prediction is 20.8 million btu/hour.

Feel free to contact me directly with questions.

Yours,



William Neuburger  
Director of Engineering

cc: PC Construction, Freeman French Freeman



Burlington Town Center  
Electrical Load Estimate - for use with planning and zoning process

|                         |                                         |
|-------------------------|-----------------------------------------|
| Electrical Load Summary |                                         |
| Residential             | 154 kVA                                 |
| Retail                  | 378 kVA                                 |
| Commercial              | 381 kVA                                 |
| Parking garage          | 74 kVA                                  |
| House and mech.         | 1,219 kVA                               |
| Sum of demands          | 2,205 kVA                               |
| Non-coincidence         | 90% Consider non-coincidence by end-use |
| Factored demand         | 1,985 kVA                               |



Burlington Town Center  
Electrical Load Estimate - for use with planning and zoning process

Residential Electrical Loads

|                                                                                                         |               |                                            |
|---------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------|
| Lighting and Receptacles                                                                                | 0.75 VA/ft^2  | Note 1                                     |
| Residential area                                                                                        | 299,213 ft^2  |                                            |
| Lighting and Receptacles                                                                                | 224 kVA       | Product of above                           |
| Appliance circuit 1                                                                                     | 1,500 VA/ft^2 | Code, 220.82(B)(2)                         |
| Number of apartments                                                                                    | 274           |                                            |
| Appliance CKT demand                                                                                    | 411 kVA       |                                            |
| Range                                                                                                   | 5,000 watt    | Typical value (one burner, one oven)       |
| Number of apartments                                                                                    | 104           | Note 3                                     |
| Range demand                                                                                            | 520 kVA       | Product of above                           |
| Clothes dryer                                                                                           | 0             | Central laundry rooms, no apartment dryers |
| Domestic hot water                                                                                      | 0             | Central DHW, no apartment water heaters    |
| Fan coil unit                                                                                           | 200 watt      | Estimated value                            |
| Number of apartments                                                                                    | 274           |                                            |
| Heat pump demand                                                                                        | 55 kVA        | Product of above                           |
| Sum of demands                                                                                          | 1,210 kVA     | Sum of demands                             |
| Demand factor                                                                                           | 23%           | Code table 220.84                          |
| Factored demand                                                                                         | 278 kVA       | Product of above                           |
| Clothing dryer                                                                                          | 0.70 kVA      | 35 pound dryer fan and drum motor          |
| Quantity of dryers                                                                                      | 30            | Estimate                                   |
| Dryer demand                                                                                            | 21 kVA        | Central laundry facilities                 |
| Diversity                                                                                               | 80%           | Match gas estimate sheet                   |
| Dryer demand                                                                                            | 17 kVA        |                                            |
| Clothes washer                                                                                          | 1 kVA         | Smaller commercial washer, spin cycle      |
| Quantity of washers                                                                                     | 30            | Estimate                                   |
| Washer demand                                                                                           | 15 kVA        | Match dryer diversity                      |
| Diversity                                                                                               | 80%           |                                            |
| Washer demand                                                                                           | 12 kVA        | Product of above                           |
| Note 1: Code section 220.82(B)(1) requires 3, we are using 3/4 to respect improved lighting efficiency. |               |                                            |
| Note 2: Assume only one appliance circuit per apartment.                                                |               |                                            |
| Note 3: Electric ranges are considered only for collegiate apartments.                                  |               |                                            |



Burlington Town Center  
Electrical Load Estimate - for use with planning and zoning process

Retail Electrical Loads

|                                                                                                                    |                                 |                                 |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|
| Lighting and general                                                                                               | 1.5 VA/ft <sup>2</sup>          | Note 1                          |
| Retail net area                                                                                                    | 127,595.0 ft <sup>2</sup>       |                                 |
| Lighting and Receptacles                                                                                           | 191 kVA                         | Product of above                |
| Check value airflow                                                                                                | 1.7 cfm/ft <sup>2</sup>         | ASHRAE pocket guide table 12.1  |
| Total cfm                                                                                                          | 216,912 ft <sup>3</sup> /minute | Product of unit value and area  |
| Pressure change                                                                                                    | 3.5 inches w.c.                 | Air handler and ductwork        |
| Fan horsepower                                                                                                     | 149.3 HP                        | Airflow formula, 80% efficiency |
| Fan demand                                                                                                         | 186.6 kVA                       | 80% power factor                |
| Total demand                                                                                                       | 378 kVA                         | Sum of above                    |
| Diversity                                                                                                          | 100%                            | No diversity for these values   |
| Factored demand                                                                                                    | 378 kVA                         | Product of above                |
| Note 1: Code 220.12 states 3 VA/ft <sup>2</sup> for this, use a smaller number to respect high efficiency lighting |                                 |                                 |

Commercial Electrical Loads

|                      |                                 |                                 |
|----------------------|---------------------------------|---------------------------------|
| Commercial area      | 207,742 square feet             | Difference of above             |
| Lighting and general | 1.0 VA/ft <sup>2</sup>          | ASHRAE pocket guide table 12.1  |
| Demand               | 208 kVA                         |                                 |
| Check value airflow  | 1.5 cfm/ft <sup>2</sup>         | ASHRAE pocket guide table 12.1  |
| Total cfm            | 311,613 ft <sup>3</sup> /minute | Product of unit value and area  |
| Pressure change      | 3.5 inches w.c.                 | Air handler and ductwork        |
| Fan horsepower       | 214.5 HP                        | Airflow formula, 80% efficiency |
| Fan demand           | 268.1 kVA                       | 80% power factor                |
| Total demand         | 475.9 kVA                       | Sum of above                    |
| Diversity            | 80%                             | Estimate                        |
| Factored demand      | 381 kVA                         | Product of above                |



Burlington Town Center  
Electrical Load Estimate - for use with planning and zoning process

Parking Garage

|                                                                                                     |                     |                                    |
|-----------------------------------------------------------------------------------------------------|---------------------|------------------------------------|
| Garage area                                                                                         | 305,039 square feet |                                    |
| Lighting and general                                                                                | 0.2 VA/ft^2         | Note 1                             |
| Demand                                                                                              | 61 kVA              | Product of above                   |
| Lowest level garage                                                                                 | 52,915 ft^2         | Only ventilate lowest level garage |
| Airflow unit                                                                                        | 1.0 cfm/ft^2        | NFPA 88A requirement               |
| Total cfm                                                                                           | 52,915 ft^3/minute  | Product of unit value and area     |
| Pressure change                                                                                     | 1.0 inches w.c.     | Air handler and ductwork           |
| Fan horsepower                                                                                      | 10.4 HP             | Airflow formula, 80% efficiency    |
| Fan demand                                                                                          | 13.0 kVA            | 80% power factor                   |
| Total demand                                                                                        | 74.0 kVA            | Sum of above                       |
| Diversity                                                                                           | 100%                | No diversity on these loads        |
| Total demand                                                                                        | 74.0 kVA            | Product of above                   |
| Note 1: The code, table 229.12 requires 0.5 VA/ft^2, use a lower value respecting improved lighting |                     |                                    |

House Loads and Mechanical Spaces

|                         |                       |                                             |
|-------------------------|-----------------------|---------------------------------------------|
| Total area              | 52,675 square feet    |                                             |
| Lighting and general    | 1.0 VA/ft^2           | Code, table 220.12, no receptacle allowance |
| Demand                  | 53 kVA                | Product of above                            |
| Elevator quantity       | 10                    |                                             |
| Unit elevator motor     | 25.0 HP               | Planning value                              |
| Elevator motor load     | 250.0 HP              | Product of above                            |
| Elevator diversity      | 75%                   | Estimate                                    |
| Factored elevator load  | 187.5 HP              | Product of above                            |
| Domestic water boost    | 75.0 psid             | Planning value                              |
| Waterflow rate          | 300.0 gallon/minute   | Planning value, note 2                      |
| Boost motor power       | 18.8 HP               | Pumping formula, 70% efficiency             |
| Diversity               | 100%                  | Diversity included in flowrate estimate     |
| Factored booster load   | 18.8 HP               | Product of above                            |
| Fluid circulating pumps | 80.0 HP               | Eight 10 HP pump motors, no diversity       |
| Exhaust fans            | 25.0 HP               | Planning value, no diversity                |
| Fire pump               | 100.0 HP              | Planning value, no diversity                |
| Stair press. Fans       | 50.0 HP               | Planning value, no diversity                |
| Cooling tower fans      | 50.0 HP               | Planning value, no diversity                |
| Condenser water pump    | 2,100.0 gallon/minute |                                             |
| Condenser water pump    | 39.9 HP               | 19 watts/gpm                                |
| Chilled water pump      | 1,680.0               |                                             |
| Chilled water pump      | 36.96 HP              | 19 watts/gpm                                |
| Total motor demand      | 588.1 HP              |                                             |
| Total motor demand      | 735.1 kVA             | 80% power factor                            |



Burlington Town Center  
Electrical Load Estimate - for use with planning and zoning process

House Loads and Mechanical Spaces Continued

|                      |                              |                                    |
|----------------------|------------------------------|------------------------------------|
| Cooling demands      |                              |                                    |
| Residential          | 1,000.0 ft <sup>2</sup> /ton | Planning value                     |
| Commercial           | 900.0 ft <sup>2</sup> /ton   | Planning value                     |
| Retail               | 800.0 ft <sup>2</sup> /ton   | Planning value                     |
| Residential space    | 299,213.0 ft <sup>2</sup>    |                                    |
| Commercial space     | 207,742.0 ft <sup>2</sup>    |                                    |
| Retail space         | 127,595.0 ft <sup>2</sup>    |                                    |
| Residential demand   | 299.2 tons                   |                                    |
| Commercial demand    | 230.8 tons                   |                                    |
| Retail demand        | 159.5 tons                   |                                    |
| Total cooling demand | 689.5 tons                   |                                    |
| Chiller efficiency   | 0.50 kW/ton                  | Very efficient chiller             |
| Chiller demand       | 431 kVA                      | Product of above, 80% power factor |
| Total demand         | 1,218.8 kVA                  | Sum of above                       |

Note 1: the code table 220.12 requires 2.0 VA/ft<sup>2</sup>, use smaller number to respect improved lighting

Note 2: This value is much lower than the plumbing code requires



Burlington Town Center

Natural Gas Load Estimate - for use with planning and zoning process

|                                |                     |
|--------------------------------|---------------------|
| Perimeter wall heating         | 3,872,186 btu/hour  |
| Roof/floor heating             | 310,022 btu/hour    |
| Ventilation heating            | 7,379,982 btu/hour  |
| Central laundry facilities     | 1,536,000 btu/hour  |
| Residential culinary equipment | 2,541,500 btu/hour  |
| Central domestic hot water     | 5,200,000 btu/hour  |
| Total                          | 20,839,690 btu/hour |



Burlington Town Center  
Natural Gas Load Estimate - for use with planning and zoning process

Perimeter Area by floor

| Floor     | Perimeter<br>(feet) | Height<br>(feet) | Area<br>(ft^2) | %   | Wall (R-21)<br>(ft^2) | Glaze/Door (R-3)<br>% | (ft^2)  |
|-----------|---------------------|------------------|----------------|-----|-----------------------|-----------------------|---------|
| Concourse | 1,390               | 15.4             | 21,406         | 50% | 10,703                | 50%                   | 10,703  |
| Plaza     | 1,915.0             | 15.5             | 29,683         | 50% | 14,841                | 50%                   | 14,841  |
| 2         | 1,371               | 10               | 13,710         | 80% | 10,968                | 20%                   | 2,742   |
| 3         | 1,371               | 10               | 13,710         | 80% | 10,968                | 20%                   | 2,742   |
| 4         | 1,371               | 10               | 13,710         | 80% | 10,968                | 20%                   | 2,742   |
| 5         | 1,538               | 13.5             | 20,763         | 50% | 10,382                | 50%                   | 10,382  |
| 6         | 1,538               | 13.5             | 20,763         | 50% | 10,382                | 50%                   | 10,382  |
| 7 N       | 1,160               | 10               | 11,600         | 40% | 4,640                 | 60%                   | 6,960   |
| 7 S       | 571                 | 13.5             | 7,709          | 30% | 2,313                 | 70%                   | 5,396   |
| 8 N       | 1,160               | 10               | 11,600         | 40% | 4,640                 | 60%                   | 6,960   |
| 8 S       | 571                 | 13.5             | 7,709          | 30% | 2,313                 | 70%                   | 5,396   |
| 9 N       | 1,160               | 10               | 11,600         | 40% | 4,640                 | 60%                   | 6,960   |
| 9 S       | 529                 | 13.5             | 7,142          | 30% | 2,142                 | 70%                   | 4,999   |
| 10 N      | 1,160               | 10               | 11,600         | 40% | 4,640                 | 60%                   | 6,960   |
| 10 S      | 529                 | 13.5             | 7,142          | 30% | 2,142                 | 70%                   | 4,999   |
| 11        | 1,160               | 10               | 11,600         | 40% | 4,640                 | 60%                   | 6,960   |
| 12        | 906                 | 10               | 9,060          | 40% | 3,624                 | 60%                   | 5,436   |
| 13        | 883                 | 10               | 8,830          | 40% | 3,532                 | 60%                   | 5,298   |
| 14        | 857                 | 10               | 8,570          | 40% | 3,428                 | 60%                   | 5,142   |
| Total     |                     |                  |                |     | 121,905               |                       | 125,999 |

Exterior wall heating demand

|                         |                    |
|-------------------------|--------------------|
| Indoor air temperature  | 70                 |
| Outdoor air temperature | -11                |
| Wall thermal demand     | 470,206 btu/hour   |
| Glazing thermal demand  | 3,401,980 btu/hour |
| Total envelope demand   | 3,872,186 btu/hour |

Exterior floor/roof heating demand

|                                 |                  |
|---------------------------------|------------------|
| Residential tower net roof area | 9,605 ft^2       |
| North tower area over garage    | 70,771 ft^2      |
| Floor/roof R-value              | 40               |
| Thermal demand                  | 310,022 btu/hour |



# Burlington Town Center

Natural Gas Load Estimate - for use with planning and zoning process

## Ventilation

| Space                                                                                                                | Size (ft^2) | ft^2/person | People | cfm/pers | Vent    |
|----------------------------------------------------------------------------------------------------------------------|-------------|-------------|--------|----------|---------|
| Residential                                                                                                          | 299,213     | 175         | 1,710  | 20       | 34,196  |
| Retail                                                                                                               | 127,595     | 75          | 1,701  | 20       | 34,025  |
| Commercial                                                                                                           | 207,742     | 125         | 1,662  | 20       | 33,239  |
| Parking garage                                                                                                       | 305,039     | N/A         |        |          |         |
| House and mech.                                                                                                      | 52,675      | N/A         |        |          |         |
| Total outdoor airflow                                                                                                |             |             |        |          | 101,460 |
| Reduce demand for residential ventilation, likely there will be heat recovery. Plan for 50% of the residential load. |             |             |        |          | -17,098 |
| Heating demand                                                                                                       |             | 7,379,982   |        |          |         |

## Residential laundry equipment

|                    |                    |                                  |
|--------------------|--------------------|----------------------------------|
| 35 pound dryer     | 64,000 btu/hour    | Typical value for 35 pound dryer |
| Quantity of dryers | 30                 | Estimate                         |
| Dryer gas demand   | 1,920,000 btu/hour | Product of above                 |
| Diversity          | 80%                | Estimate                         |
| Dryer demand       | 1,536,000 btu/hour | Product of above                 |

## Residential culinary equipment

|                 |                     |                                                     |
|-----------------|---------------------|-----------------------------------------------------|
| Range           | 65,000 btu/hour     | NFPA 54, table 5.4.2.1                              |
| Quantity ranges | 170                 | Non-collegiate housing                              |
| Range demand    | 11,050,000 btu/hour | Product of above                                    |
| Diversity       | 23%                 | Mimic diversity allowed by electric code for ranges |
| Range demand    | 2,541,500 btu/hour  | Product of above                                    |



Burlington Town Center  
 Natural Gas Load Estimate - for use with planning and zoning process

Central domestic hot water

|                                                                    |           |              |                                          |
|--------------------------------------------------------------------|-----------|--------------|------------------------------------------|
| Commercial clothes washer                                          | 3         | Fixture unit | Plumbing code, table 709.1               |
| Quantity of washers                                                | 30        | Estimate     |                                          |
| Fixture units of washers                                           | 90        | Fixture unit | Product of above                         |
| Residential bathroom group                                         | 5         | Fixture unit | Plumbing code, table 709.1               |
| Quantity of bathroom groups                                        | 274       |              |                                          |
| Fixture units of washers                                           | 1,370     | Fixture unit | Product of above                         |
| Residential kitchen sink w/DW                                      | 2         | Fixture unit | Plumbing code, table 709.1               |
| Quantity of kitchen sinks w/DW                                     | 274       |              |                                          |
| Fixture units of sinks w/DW                                        | 548       | Fixture unit | Product of above                         |
| Public lavatory                                                    | 1         | Fixture unit | Plumbing code, table 709.1               |
| Quantity of lavatories, retail                                     | 14        | Estimate     |                                          |
| Quantity of lavatories, office                                     | 44        | Estimate     |                                          |
| Fixture units of lavatories                                        | 58        | Fixture unit | Product of above                         |
| Service sink                                                       | 2         | Fixture unit | Plumbing code, table 709.1, note 1       |
| Quantity of service sinks, retail                                  | 4         | Estimate     |                                          |
| Quantity of service sinks, office                                  | 11        | Estimate     |                                          |
| Fixture units of service sinks                                     | 30        | Fixture unit | Product of above                         |
| Total fixture units                                                | 2,096     |              |                                          |
| Flowrate                                                           | 130       | gall/min     | Hunters curve for residential            |
| Entering water temperature                                         | 40        | deg F        | Lowest likely water temperature          |
| Leaving water temperature                                          | 120       | deg F        | Likely supply water temperature          |
| Water heat efficiency                                              | 95%       | Estimate     |                                          |
| Natural gas demand                                                 | 5,200,000 | btu/hour     | Heatflow ~ flowrate x 500 x flow x temp. |
| Note 1: Some sources indicated 2.5 fixture units for service sink. |           |              |                                          |
| DW = dishwasher                                                    |           |              |                                          |



Burlington Town Center

Spaces and floor areas - for use with planning and zoning process

| Floor | Residential |           |         | Commer.<br>Area | Retail<br>Area | Utility<br>Area | Parking<br>Area | Total<br>Area |
|-------|-------------|-----------|---------|-----------------|----------------|-----------------|-----------------|---------------|
|       | Total       | Collegiat | Area    |                 |                |                 |                 |               |
|       |             |           |         |                 |                |                 |                 |               |
| Conc. | 0           | 0         | 0       | 0               | 80,703         | 14,317          | 2,562           | 97,582        |
| Plaza | 0           | 0         | 0       | 0               | 46,892         | 0               | 52,915          | 99,807        |
| 2     | 19          | 0         | 19,957  | 0               | 0              | 8,358           | 79,512          | 107,827       |
| 3     | 21          | 0         | 22,523  | 0               | 0              | 0               | 85,025          | 107,548       |
| 4     | 21          | 0         | 24,323  | 0               | 0              | 0               | 85,025          | 109,348       |
| 5     | 0           | 0         | 0       | 70,840          | 0              | 0               | 0               | 70,840        |
| 6     | 0           | 0         | 0       | 70,840          | 0              | 0               | 0               | 70,840        |
| 7     | 34          | 14        | 34,884  | 17,755          | 0              | 0               | 0               | 52,639        |
| 8     | 34          | 14        | 34,884  | 17,755          | 0              | 0               | 0               | 52,639        |
| 9     | 34          | 14        | 34,884  | 15,276          | 0              | 0               | 0               | 50,160        |
| 10    | 34          | 14        | 34,884  | 15,276          | 0              | 0               | 0               | 50,160        |
| 11    | 34          | 14        | 33,484  | 0               | 0              | 0               | 0               | 33,484        |
| 12    | 16          | 12        | 20,570  | 0               | 0              | 0               | 0               | 20,570        |
| 13    | 14          | 11        | 19,794  | 0               | 0              | 0               | 0               | 19,794        |
| 14    | 13          | 11        | 19,026  | 0               | 0              | 0               | 0               | 19,026        |
| Mech  | 0           |           | 0       | 0               | 0              | 30,000          | 0               | 30,000        |
|       |             |           |         |                 |                |                 |                 |               |
| Total | 274         | 104       | 299,213 | 207,742         | 127,595        | 52,675          | 305,039         | 992,264       |
|       |             |           |         |                 |                |                 |                 |               |

Based on October 19, 2016 PKSB drawing package

Area in square feet



## **8.0 LIST OF DRAWINGS:**

T-000 COVER SHEET

### **CIVIL**

C1.0 EXISTING & ADJUSTED PARCEL BOUNDARIES  
C1.1 EXISTING CONDITIONS PLAN  
C1.2 DEMOLITION PLAN  
C1.3 SITE PLAN  
C1.4 GRADING PLAN  
C1.5 UTILITY PLAN  
C1.6 EROSION PREVENTION AND SEDIMENT CONTROL PLAN  
C2.1 ST PAUL STREET PROFILE  
C2.2 CHERRY STREET PROFILE  
C2.3 PINE STREET PROFILE  
C2.4 BANK STREET PROFILE  
C2.5 ROAD SECTIONS  
C2.6 ROAD SECTIONS  
C3.0 SITE DETAILS AND NOTES  
C3.1 WATER DETAILS AND NOTES  
C3.2 SEWER DETAILS AND NOTES  
C3.3 STORMWATER DETAILS  
C3.4 EROSION PREVENTION AND SEDIMENTATION CONTROL DETAILS

### **LANDSCAPE**

LA-200 LAYOUT PLAN  
LA-400 PLANTING PLAN  
LA-500 LIGHTING/ PHOTOMETRIC PLAN

### **ARCHITECTURAL**

AD-001 OVERALL DECONSTRUCTION PLAN  
Z-001 LOT COVERAGE DIAGRAMS I  
Z-002 LOT COVERAGE DIAGRAMS II  
Z-003 ZONING SITE PLAN  
Z-021 ZONING SECTIONS  
A-051 FLOOR PLANS 1<sup>ST</sup>-4<sup>TH</sup> FLOORS  
A-052 FLOOR PLANS 4<sup>TH</sup>-11<sup>TH</sup> FLOORS  
A-053 FLOOR PLANS 12<sup>TH</sup> FLOOR - ROOF  
A-201 ELEVATIONS – CHERRY STREET & ST. PAUL STREET  
A-202 ELEVATIONS – BANK STREET & PINE STREET  
A-211 BUILDING SECTION I  
A-221 WALL SECTIONS I – CHERRY STREET  
A-222 WALL SECTIONS II – CHERRY STREET  
A-223 WALL SECTIONS III – CHERRY STREET  
A-224 WALL SECTIONS IV – BANK STREET



A-225 WALL SECTIONS V – BANK STREET

A-226 WALL SECTIONS VI – BANK STREET

A-401 RENDERED PERSPECTIVES – AERIAL

A-402 RENDERED PERSPECTIVES – CORNER VIEWS



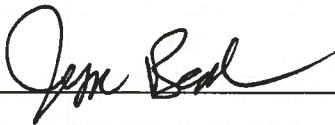
## 9.0 FIGURES



### Pre-Application Public Neighborhood Meeting Certification

I, Jesse Beck, certify that that the Pre-Application Public Neighborhood Meeting requirement pursuant to Sec. 3.2.1(d) of the *Burlington Comprehensive Development Ordinance* has been satisfied in accordance with the procedures and requirements set forth by the Department of Planning and Zoning for a public neighborhood meeting held on (see attached spreadsheet) at \_\_\_\_\_.

A copy of the meeting date, time and location; list of attendees with contact information; NPA meeting minutes or meeting notes summarizing the discussion; and method and copy of public notice is attached and made a part of this Certification.

Signature: 

STATE OF VERMONT

COUNTY OF Chittenden

The above and foregoing Affidavit as subscribed before me this 6 day of December, A.D., 2015 personally by Jesse Beck.

  
NotaryPublic

My Commission expires: Feb. 10, 2016

Seal







freeman | french | freeman

FIGURE 1-A  
**MEMORANDUM**

Freeman French Freeman Inc. | Architecture • Planning • Interiors  
81 Maple Street • Burlington Vermont 05401  
802-864-6844 • [www.fffinc.com](http://www.fffinc.com)

**Project Name:** BTC: P&Z, 30% Docs.

**Project Number:** A1636

**Date:** 12/12/2016

| Ward | Date     | Coordinator                                                                            | Who attended     | Minutes: Y/N |
|------|----------|----------------------------------------------------------------------------------------|------------------|--------------|
| 4/7  | 6/22/16  | Liam Griffin<br><a href="mailto:liamgriffin@me.com">liamgriffin@me.com</a>             | Don              | Y            |
| 1/8  | 8/10/16  | Richard Hillyard<br><a href="mailto:pompeyhccc@hotmail.com">pompeyhccc@hotmail.com</a> | Don              | Y            |
| 6    | 9/1/16   | Clare Wool<br><a href="mailto:clarewool@me.com">clarewool@me.com</a>                   | Don & Jesse      | Y            |
| 2/3  | 9/8/16   | Ryan McLaren<br><a href="mailto:ryan.d.mclaren@gmail.com">ryan.d.mclaren@gmail.com</a> | Don, Jesse & Liz | Y            |
| 5    | 9/20/16  | Nate Orshan<br><a href="mailto:natosongs@gmail.com">natosongs@gmail.com</a>            | Don & Jesse      | Y            |
| 1/8  | 10/12/16 | Richard Hillyard<br><a href="mailto:pompeyhccc@hotmail.com">pompeyhccc@hotmail.com</a> | Jesse & Liz      | Y            |
| 2/3  | 10/13/16 | Ryan McLaren<br><a href="mailto:ryan.d.mclaren@gmail.com">ryan.d.mclaren@gmail.com</a> | Don              | Y            |
|      |          |                                                                                        |                  |              |
|      |          |                                                                                        |                  |              |
|      |          |                                                                                        |                  |              |
|      |          |                                                                                        |                  |              |
|      |          |                                                                                        |                  |              |
|      |          |                                                                                        |                  |              |

CC:

|               |           |  |  |
|---------------|-----------|--|--|
| File A1636.00 | Don Sinex |  |  |
| Liz Miller    |           |  |  |



FIGURE 1-A



Wards 4 & 7 NPA  
June 22, 2016  
7:00-9:00 pm  
The Miller Center, 130 Gosse Court, Burlington  
Agenda  
Draft

- 6:45-7:00 - Social Time and Snacks
- 7:00-7:15 - Ground-rules, introductions, announcements, nominations and requests.
- 7:15-7:30 - Open Forum
- 7:30-8:00 - Don Sinex - Burlington Town Center Redevelopment (10 minute presentation  
- 20 minute Q&A) - Plus either CEDO and/or Planning & Zoning
- 8:00-8:15 - Burlington Police Department - Lt. Michael D. Warren
- 8:15-8:30 - CCTA Discussion - David Armstrong
- 8:30-9:00 - Elected and Appointed Officials
  - City Councilors
  - School Board Members
  - Legislative Representatives
  - Department of Public Works

**Ward 4 Steering Committee**

Matt Cropp, Green Acres Dr., 338-1002  
Dan Weber, Muirfield Road, 999-8043

**Ward 7 Steering Committee**

Liam Griffin, Billings Ct, (347) 647-0371  
Martha Molpus, Heineberg Rd., 652-0323  
Michael McGarghan, Birch Ct., 233-1238  
Linda Deliduka, Village Green, 864-5114  
David Kirk

**GROUND RULES**

Listen to others speaking  
Respect the agenda and process  
Share your opinion politely  
Treat people respectfully





## Neighborhood Planning Assembly Attendees

| NPA<br>(choose one) | Wards<br>1 & 8 | Wards<br>2 & 3 | Wards<br>4 & 7 | Ward<br>5 | Ward<br>6 |
|---------------------|----------------|----------------|----------------|-----------|-----------|
|---------------------|----------------|----------------|----------------|-----------|-----------|

Date of Assembly : 6-22-16 Location: Miller Ctr.

Please return to your convenor, Phet Keomanyvanh  
or email to cedofd@burlingtonvt.gov

- MARY HART 7
- 1 Liz Miller
  - 2 Don Sinex + 1
  - 3 Roger Bergman
  - 4 Martie Majoros
  - 5 Margaret Tenness
  - 6 Julie Hill
  - 7 Kelly Cross
  - 8 Pat Hathaway
  - 9 Marie Moises
  - 10 Diane H Morris
  - 11 DEAN WEAVER
  - 12 Wayne Dutchman
  - 13 Pat Dutchman
  - 14 Martin Waldron
  - 15 ARNIE KRIEGER
  - 16 Matea Molpus 7
  - 17 Caryn + Michael Long Ward 1
  - 18 G Simpson Ward C
  - 19 Jon Jon Ward 2
  - 20 CHAS Trombly 7
  - 21 Nick + Sherrin Albers
  - 22 Betsy Lawrence
  - 23 Michael Palmer
  - 24 Shuley Washburn
  - 25 Tony Alton
  - 26 Sheryl Chamberlain
  - 27 Patricia Branch
  - 28 Nick Branch
  - 29 Paul Cruz
  - 30 Joanne Hunt
  - 31 Sonam Chopel
  - 32 Leering Chodon
  - 33 Ngodup Dolma
  - 34 Ken McGarvey
  - 35 Jay McGarvey
  - 36 Bakt Payne
  - 37 Rob Whelan
  - 38 Ken Pelletier WMS
  - 39 Robert Herendson +
  - 40 ANN TAYLOR
  - Janet Patterson
- Sandi Amemoria 7





Wards 4 and 7 NPA Meeting  
Wednesday, June 22, 2016  
Draft

Robert E. Miller Community Center  
130 Gosse Court, Burlington, VT

Meeting Start: 7:00pm

Steering Committee members: Michael McGarghan, Matt Cropp, Linda Deliduka,  
Martha Molpus

### **Welcome & Introductions**

Facilitator: Michael McGarghan

Chris Trombly, Ward 7 resident, was nominated for the Steering Committee. Out of 26 Ward 7 residents, 25 voted Yes, with Mr. Trombly abstaining.

Sandi Omanovic, Ward 7 resident, was nominated for the Steering Committee. Out of 26 Ward 7 residents, 25 voted Yes, with Mr. Omanovic abstaining.

### **Open Forum**

The Rivers Edge' gate is currently kept locked; there is a proposal to open the gate to create an emergency exit. The resident voiced support for keeping the gate closed, due to safety, cost of maintenance, and concern about excess traffic.

Coalition for a Livable City advocates that the proposed mall redevelopment height goes against community benefit and PlanBTV vision.

Resident voiced a concern about the Burlington College development compromising one of the most prominent natural open spaces in City limits.



The bike lane pilot project is slated to begin Thursday, June 23, and is on schedule to be completed by Monday, June 27, pending weather.

### **Presentation by Don Sinex, Mall Developer**

Mr. Sinex's first thought upon reviewing the site was how it could be improved to better serve the purposes of living and working downtown in a present-day economy. He met with Mayor Weinberger and was informed of PlanBTV. His design integrated the plan, and his team is committed to environmentally sound development to increase vibrancy and investment. This will increase the walkability of downtown, and the ability to live and work in Burlington. The current design is not relevant; essentially an outdated suburban mall concept in the core of a downtown. The project will bring 900 construction jobs during development, and 1,200 permanent jobs in diversified sectors. The project is still in the design and public input process, and is receptive to feedback; the project has already been changed in design many times in response to constructive public input.

### **Burlington Police Department – Lt. Michael D. Warren**

Lt. Warren has been in law enforcement for 18 years. His primary area of responsibility is the New North End. Some of the concerns heard from residents include vandalism using BB guns and bricks to break windows. Although these are low-level offenses from a criminality perspective, they are important to the department, and resources are being allocated. Neighborhood coordination is encouraged to deter and respond to vandalism and related offenses; email list serves and Front Porch Forum are avenues for this.

### **CCTA – David Armstrong**

GMTA merge will be rural and add more routes, including 15 minute service from Cherry at no additional cost to the city. Transit station will open in August or September, and will have public bathroom.

Automatic vehicle location, so patrons can know when a bus is coming, will be available in a mobile app. Additionally, mobile app will be used for ticketing, to provide an alternative to cash or a paper ticket. In response to a public question, adding debit card functionality to the fare boxes would be a retrofit upgrade costing approximately one million dollars; the mobile app option will be more cost-effective.



Currently in the process of a redesign to look at systems changes across the area to be more efficient and effective, including the Bridge Program which uses data to inform the department about how patrons are using the system.

### **Elected and Appointed Officials**

Councilor Kurt Wright – Charter change in March. We are the only City that uses Party designation in local municipal races. This will be put on the ballot.

Looking at residency requirement update, requiring department heads to live in Burlington. If a hardship exemption exists, they would have one year to move into city.

Councilor Tom Ayers-Pilot project to be implemented beginning Thursday the 23<sup>rd</sup> and finishing by Monday the 27<sup>th</sup>. A City Council meeting on October 17<sup>th</sup> will address whether to keep the change or move back to the current configuration. Public input is accepted in all forms, and a survey will come in August or September.

Anne Judson, School Board Commissioner – We're focused on the needs of safety and education, not wants. Champlain school is overcrowded. Bond may come in the fall, but working with City on where to save money and share cost. Looking to cut 1.2 million.

Meeting adjourned at 9:03pm.

Note Taker: Phet Keomanyvanh, CEDO





Location: UVM Medical Center, McClure Lobby Conference Room  
Date: August 10, 2016  
Time: 7.00 p.m.  
Draft

Agenda:

7.00 p.m.: Welcome and Introductions

7.05: City Council Update: Adam Roof, Sharon Bushor, Selene Colburn: This will certainly include updates on Burlington Town Center, with a City Council Meeting due August 15th to discuss proposed Zoning Changes.

7.30: Speak Out

7.40: Burlington Schools update from Board Chairman Mark Porter

7.50: New UVM Rescue Building on East Avenue: Lisa Kingsbury of UVM to discuss.

8.00: Fletcher Place development project: Frank Von Turkovich has been bringing plans to the NPA and immediate neighborhood for four years or more now. He joins us again with modified proposals.

8.45: Close

Parking: In the McClure Garage, free, courtesy of UVM MC.



FIGURE 1-A



## Neighborhood Planning Assembly Attendees

|                     |                                  |                |                       |                |                       |                |                       |           |                       |           |
|---------------------|----------------------------------|----------------|-----------------------|----------------|-----------------------|----------------|-----------------------|-----------|-----------------------|-----------|
| NPA<br>(choose one) | <input checked="" type="radio"/> | Wards<br>1 & 8 | <input type="radio"/> | Wards<br>2 & 3 | <input type="radio"/> | Wards<br>4 & 7 | <input type="radio"/> | Ward<br>5 | <input type="radio"/> | Ward<br>6 |
|---------------------|----------------------------------|----------------|-----------------------|----------------|-----------------------|----------------|-----------------------|-----------|-----------------------|-----------|

Date of Assembly : 8 / 10 / 16 Location: UVM Medical

Please return to your convenor, Phet Keomanyum  
or email to [cedofd@burlingtonvt.gov](mailto:cedofd@burlingtonvt.gov)

1 Dana Hamenick  
2 William O. Suiter  
3 William P. Hinkle  
4 Jason Williams  
5 Nancy Kirby  
6 Bob Butan  
7 Richard Hillyard  
8 Tyler Mitchell BFD  
9 Scott Kipeter BFD  
10 Angie Chappi-Sokol  
11 Jonathan Chappi-Sokol  
12 Sharon Bushor  
13 Lisa Kingsbury  
14 Jim Barr  
15 Caryn Long  
16 Edmon Turzovich  
17 Selene Colburn  
18 Lani Ravin  
19 Ghad Mahnke  
20 K. Van Wehlich

21 Mary Heid.  
22 Mark Pater  
23 Adam Hoop  
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UVM Medical Center, McClure Lobby Conference Room  
August 10, 2016  
7.00 p.m.  
Draft Minutes

Start: 7:05

Steering Committee member present: Emily Lee, Richard Hillyard

Agenda:

**7pm Welcome and Introductions:**

See attendance list

**City Council Updates: Adam Roof, Sharon Bushor, Selene Colburn**

Adam Roof-Burlington Town Center dates moving forward to the full City Council. Meeting dates are 15<sup>th</sup> at 6pm Special Work Session, 18<sup>th</sup>, 22<sup>th</sup>, 24<sup>th</sup>. Meeting times can be found on the City's Government Calendar <https://www.burlingtonvt.gov/Calendar> . 3-D model of the Town Center project will be displayed at Fletcher Free model.

Selene Colburn-Community Development and Revitalization committee; have been meeting to discuss housing policy and troubleshooting about homelessness. This has brought up conversation about encampment and solutions such as tiny houses. Still exploring solutions. The Committee will be sponsoring a forum to look at micro-housing and broadly how it will play in housing action plan. Will be inviting CODE in September or October to look at new practices in inspection to know what is expected in compliance. Also will expect report on inclusionary zoning and looking at neighborhood revitalization in housing stock of historical housing that have been used in student and turning over to original usage.

Sharon Bushor- Ordinance Committee; looking at Town Center there are two parts which is the overlay ordinance and the project itself. The 3-D model only shows foot print of project but not the ordinance overlay. The model is to scale. When you go it will be labelled and will address the height of 160feet.

Schedule 6 meetings for the Ordinance committee. The Committee was given an ordinance that had edits that would defined agreements from the Planning Commission. The committee went through the ordinance line by line looking at controversy and non-controversy matters. Changes proposed are that the size is too big and should be scaled back. Eliminating Macy's and 2 parking structures won't impact project but change the ordinance overlay zone.

**Speak out:**

-Planning Commission recommend that the energy guidelines of the building reach gold and that the developer be bonded to reach a LEED Standard of Gold. The developer agrees to have equivalent but not reach gold. The Planning Commission is asking for high quality energy efficient building and the developer meets this. This tool is in the language in the ordinance. Planning Commission finished, sent to ordinance and now it's on to full council. Next big project for the commission is former Burlington College and working to have this parcel developed.

-Feel that this project was pushed through too fast and meetings are jammed together and model is too small which doesn't show the whole overlay. Troubling that storm water is lined up and not in the promise.

-Need to get additional affordable housing. Don't set a standard but give developer incentives to do things for the community. Concerned about terrible landlords that are horrible to their tenants. This may be cause for some state statue.

-SD Ireland leasing apartment on Sept. 1. Posting weekly developments of their projects.

**Burlington School District: Mark Porter, Chair**

BSD has a Capital Plan. Last improvement work done was on Edmunds Elementary. The district had a study done on capital needs. Goals are to take care of ADA and Space which will help improve quality of education and tax payer investment. At BHS connecting doors to auditorium freezes in the winter and the phone system is really old and outdated. If you call 911 then they wouldn't know where you are. Other issues of aspects are elevator repair, windows. With space looking at projections of repair over 10yr to be \$65,320,854. Really, total improvement work would be 100million. In moving forward, the District will bring in public participating include New American communities and provide translators. Tax % change in income 5.53. Voting cycle is November and will move fast on this. Mark will come back in September for Wards 1 and NPA 8 to give an update.

For further details about capital improvement look on BSD website.

<http://district.bsd.schoolfusion.us/modules/cms/pages.phtml?pageid=334221>



### **New UVM Rescue Building- Lisa Kingbury, Lani Raven**

The UVM Rescue project was approved by Development Review Board (DRB) on Monday. There is requirement to bring any major impact project to the NPAs but this is not a major project. This development is located on 284 East Ave at the South End of East Ave. UVM Rescue is primary for UVM. It's been pretty cramp quarters and one ambulance needs to stay outside and ambulances have equipment that need to stay warm to function timely and effectively. The development will have room to house both ambulances. The area will be improved and not increase scope of activity or parking.

Another development project on UVM campus is to the Bailey Howe Library. This development has already going to DRB and will connect first year housing project to the library. The bridge is creating new entrance to the library which needs space for lobby and foyer. Also will have indoor bicycle structure. Bridge will have weather protection and be conditioned. The campus master planning is to build connections between building so students can get around and stay out of the elements.

### **Fletcher Place development-Frank Von Turkovich**

Project on Colchester Ave. Fletcher project would supply affordable and needed housing for Medical workforce community. Two buildings connected by a small connector and will have medical offices and practice. Underground parking, surface parking, bike parking. Lower entrance goes to sidewalk will allow residents to have convenience to medical practice. In the lobby there will be elevator that go to studios. Will not demolish existing structures that are already there. This new development will be set behind the existing building. Current plan tonight shows 73 but may reduce in units. Still need to develop technical issues and not sure when going to be ready to go in front of DRB. Excavated soil may be use on the site which City and State encourage but a lot of it will be taken away. Geo test of soil will be available to first City and State then can be available to private entities. Building design is contemporary. Not looking for this to be student housing but to house work-force development for medical staff. The plan will be one bedroom and studio units. Studios will be \$1400-1500 month. There will be a number of affordable housing units which is required under exclusionary zoning. One bed room units will be 500square feet. Not settled on the floor plan and looking at a few designs.

Close: 9:20pm

Minutes taken by Phet Keomanyvanh

CEDO-Community Engagement Specialist-Public Engagement

FIGURE 1-A



September 1, 2016 at **7:00 Morgan Room, Aiken Hall, Champlain College**

*Facilitator: Clare Wool; Minutes: Charles Simpson; Treats: Charles Simpson;*

*Videographers: TBD*

- 6:45 Social time food and refreshments
- 7:00 Agenda overview and approval of June 2, 2016 Minutes
- 7:05 School Board Update - Stephanie Seguino and Miriam Stoll
- 7:20 Champlain College Update – John Caulo and Sandy Yusen
- 7:30 UVM Update – Lisa Kingsbury
- 7:40 Burlington Town Center – Ann Taylor and Don Sinex along with representatives from the Coalition for a Livable City
- 8:40 City Council Update – Karen Paul and Joan Shannon
- 8:55 Members Items/Open forum
- 9:00 Adjourn

**Ward 6 Steering Committee:**

Peter Keating, 922-7846,

[keating@burlingtontelecom.net](mailto:keating@burlingtontelecom.net)

Charles Simpson, 865-5110,

[Charles.simpson@plattsburg.edu](mailto:Charles.simpson@plattsburg.edu)

Julie Richards, [julie@juliecrichards.com](mailto:julie@juliecrichards.com)

Clare Wool, ([clarewool@me.com](mailto:clarewool@me.com))

Caroline Saba [caroline.saba@gmail.com](mailto:caroline.saba@gmail.com)

**City Councilors:**

Karen Paul, 863-3817, [paulfin@sover.net](mailto:paulfin@sover.net)

Joan Shannon, [jshannon@burlingtonvt.gov](mailto:jshannon@burlingtonvt.gov)

**Board of School Commissioners:**

Stephanie Seguino, [sseguino@bsdvt.org](mailto:sseguino@bsdvt.org)

Miriam Stoll [mstoll@bsdvt.org](mailto:mstoll@bsdvt.org)

**State Representatives Chittenden District 6-3**

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[curt.mccormack@gmail.com](mailto:curt.mccormack@gmail.com)

Jill Krowinski (D) 363-3907 [jkrowinski@leg.state.vt.us](mailto:jkrowinski@leg.state.vt.us)

**Chittenden District 6-5:**

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Mary Sullivan (D) 862-6632

[marysull@yahoo.com](mailto:marysull@yahoo.com)

**Chittenden District 6-6:**

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[barbara.rachelson@gmail.com](mailto:barbara.rachelson@gmail.com)

**State Senators:**

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[timashe@burlingtontelecom.net](mailto:timashe@burlingtontelecom.net)

Philip Baruth (D) 656-3298 [pbaruth@leg.state.vt.us](mailto:pbaruth@leg.state.vt.us)

Virginia “Ginny” Lyons (D) 863-6129

[vlyons@leg.state.vt.us](mailto:vlyons@leg.state.vt.us)

Michael Sirotkin (D) 999-4360 [msirotkin@leg.state.vt.us](mailto:msirotkin@leg.state.vt.us)

Diane Snelling (R) 482-4382 [dbsnelling@aol.com](mailto:dbsnelling@aol.com)

David Zuckerman (P/D) 598-1986 [davidz@together.net](mailto:davidz@together.net)

For information on accessibility, alternate forms of the agenda, including something on the agenda, etc., of the Ward 6 Neighborhood Planning Assembly, contact any of the Steering Committee members listed above. The Ward 6 NPA strives for flexibility in planning before and during the meeting. Accordingly, the specifics of the agenda and the allocated times may change.



FIGURE 1-A



## Neighborhood Planning Assembly Attendees

| NPA<br>(choose one) | Wards<br>1 & 8 | Wards<br>2 & 3 | Wards<br>4 & 7 | Ward<br>5 | Ward<br>6 |
|---------------------|----------------|----------------|----------------|-----------|-----------|
|---------------------|----------------|----------------|----------------|-----------|-----------|

Date of Assembly : 9-1-16 Location: Morgan Room,

Please return to your convenor, Phet Keomanyvanh, Champlain College  
or email to **cedofd@burlingtonvt.gov**

1 Heather Scott

2 Mark Heinzer

3 Karen Freudenberge

4 Diane Gayer

5 Margaret Murray

6 Tom and Adrienne Donohue

7 Anita Reppin

8 Jared Knepper

9 Sandy Yensen

10 Michael Rooney & Susan Dorn

11 ANN TAYLOR

12 Mr D. Ashton

13 Gary Chassman

14 Deborah Boothby

15 STEVE GOODKIND

16 Mary Gade

17 Jim Barr

18 Caryn Long

19 Greg Eperwood

20 Joe Speidel

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DRAFT     DRAFT     DRAFT     DRAFT

Meeting of NPA 6, Aiken Hall, Champlain College, Sept. 1, 2016

Approximately 26 people in attendance plus speakers and NPA steering committee.  
Steering Committee member present: Clare Wool and Charles Simpson.

Minutes:

1. Meeting began at 7:04; Clare Wool presented the agenda for approval.
2. Stephanie Seguino and Miriam Stoll from the School Board gave an up-date.  
Summer construction on various buildings, including Edmunds School, is complete. Burlington High School is poised for positive change. Partnership for Change members have had their program, Architecture for Equity, funded for the coming year. The district audit of facilities last year and determined that \$65 million is needed to correct problems, including deferred maintenance. The Board will be considering two options. 1) Address and correct all deferred maintenance problems but not build a new high school. 2) Do K-12 repairs and analyze the need for a new high school over this school year. Moving ahead with repairs will require asking voters to approve a \$19 million bond issue. This translates into an additional tax burden for the average home owner of \$91 per month. The bonding vote could come in November or March. After fact-finding, contract negotiations with the teachers' union will resume on 9/12. Question (Q): Does the state participate in such expenses? Answer (A) No. School repair issues are a national problem estimated at \$4 billion; this isn't due to our neglect here. Q. For how long is the bond? A. 10 years. Q. Will it result in improvements such as energy efficiency or just a return us to the status quo? A. We don't want just a patch-up. \$10 million goes to put our schools in compliance with ADA. Q. Will you give equal weight to rehab as well as a new high school building? A. The size of the HS is adequate, so yes, though ADA compliance is an issue. Keeping the present building is not off the table.
3. Sandy Yusen and a Champlain College Student Government rep., Gerard --?, spoke. CC Student Government will have a rep. at NPA 6 this year as part of their community outreach effort. A new Women and Gender Studies Center has opened on campus. A faculty art exhibition has opened in the college gallery. Yusen thanked the community for bearing with the college during "move-in weekend". This year they welcomed the largest college class yet and CC will be housing some upper class students in three off-campus facilities, 287 College St.; Bayberry Place, and Spinner Place, Winooski. There will be staff in each location. Eagles Landing is scheduled to be open to students in the fall of 2018. The last campus building project in the master plan, Information Technology Science, is in the planning stage. ITS programs will include cyber security. Some landscape construction is being completed. As a safety and diversity move, the college is painting the crosswalk at So. Willard near Maple in a rainbow pattern. Enhanced crosswalk visibility is being studied for So. Willard crossings. Q. Students are hard to see until they are in the street. A. We are looking into a blinker system. We know we need additional lighting there. Q. We need lighting that covers the middle of the street, not so much a blinker. A. We are looking into this. There will be a raised portion of the crosswalk. Q. Who pays for it? A. The city, we



expect. This is an open conversation. Q. Why the delay at Eagles Landing? A. We are still negotiating with the City for the Brown's Court property. Q. What are your student numbers? A. 2100 now, which is generally even with figures for the past five years. Others students are abroad. Of the 2100, 632 are first-year students. Check for our welcoming event information on the table.

4. Gail Shampnois and Joe Speidel represented UVM. New construction underway will add 300 beds to the previous number on campus. These dorms will open in Fall 2017. The STEM building will open later. The new class has higher than pervious GPA and SAT scores. More Vermont high school grads are attending with free tuition than perviously. We are working with our city counselors, the police dept., and code enforcement to address problem incidents off campus. We are funding police officers to be in the neighborhoods on weekends, including on So. Prospect. We will be mapping incidents so as to take pro-active initiatives. The trends in this area are positive. Thanks for bearing with us during move-in. We are informing all students about the behavior that is expected of them in the community, and will be distributing 500 information and treat bags Sept. 10. We've worked with Councilor Karen Paul on this effort to raise awareness. Call Gail's office with any problems you experience in this regard. We also are running late night student shuttles. (Karen Paul): noise complaints have fallen sharply, sometimes being resolved in 24 hours with the help of the code enforcement officer. Q. Don't you have space to build dorms on the Trinity Campus? A. Yes. We are looking at that. That might need a zoning change "down the line". Q. I want to report that the Wellness Campus is effective. A. Yes, it now is oversubscribed.
5. Ann Taylor, Don Sinex, and Jesse Beck, President of Freeman French Freeman, Inc., presented information on the proposed Burlington Town Center. Taylor said Burlington is a great place to live and the project won't injure it. Business supports it. Sinex said he purchased the property 3 years ago and for the past 2 years has worked with the mayor, Council, Planning and Zoning, and the Planning Commission to refine the plan. BTC is 40 year old and sits on 5 acres or 215,000 sq. feet of land. Physical retail is in a state of flux currently and each year appears to be declining, hence the problems cited by Macy's Corp closing some stores. If they close here, you'll know as soon as I will. I hope not. The site is perfect for mixed use, stacked vertically. This cuts down on auto trips. Our two years of work has gotten us a good design. (At this point he showed slides of the site and the proposed buildings.) These will be true public streets with access to all vehicles, including fire trucks, and pedestrians and bikes. Slopes won't be over 4.5 degrees and so ADA compliant. They aren't perfect. There is a 20 foot drop between Cherry and Bank Streets and 20 feet between Church and Pine. The project will revitalize the downtown, according to an economic impact study done for us by a UVM professor, generating 900 temporary and 1200 permanent jobs. There will be \$200 million of additional economic activity surrounding the mall, including rebuilding on Bank Street. Now there is no storm water management at all. We will improve this, catching, storing, and slowly releasing water to reduce impact on the city's systems. We are working with DPW on this, and storage will be on the 5th floor. Both the streets and the observation deck will be public amenities. There is a problem. We can get clearance of 13'6" for each street with the exception of the ramp under the Free Press Building,

which is 12'. Our largest fire truck is 12' If we were to increase the slope to lower the ramp, we'd increase the incline and create problems as the road meets the Macy's entrance. They'd need steps. So Macy's isn't pleased. But the roads will be 60' wide. Yes, they won't be perfect in that they won't align with the streets they connect with. We can't move the Free Press building. And the NBT Bank building is also in the way. We still aren't done with our planning process and need to meet with DRB and the Conservation Board. They wanted us to make the garage disappear. It is self-ventilating and 50% open, using screens with holes. From the sidewalk, you can't see through the screens but you could face-on. From the street you won't see car lights or cars. The buildings are well-designed with setbacks so the pedestrian experience from the street is such that you won't feel the height. A bird will see it, but not a pedestrian. Our goal is for the pedestrian to feel the street vitality, not the height. We think we have the right balance. 50,000 feet of the plot are streets, deeded to the city. Yes, we can ask to close them for events, just as any city street could be closed through the proper procedure for a proper purpose. This is a large space for community functions, an outdoor plaza. Parking: We wanted underground but the cost is \$75 million not the \$25 million we'll pay for above-ground parking. We can't pay for it. It requires a 45 foot hole over 125,000 sq. ft., and excavation would take 9 months and many trucks coming and going. Downtown soil is often contaminated so disposal could add \$100 a cubic yard for 200,000 yards. It's impossible. Height? You won't feel it. Inclusionary Zoning? We have full IZ compliance that will never go away, set at 60% of median income. Shops, "most of the shops" will be entered from the street. We may need a clinic, a pet shop, a pre-school; it is hard to say at this point. TIF's? I'm giving up property. I can't build the roads. If the public wants them, they should pay. I've been told that Farrell's project has the developer building the streets. But he's getting \$2 million from the city (for the park) and money is fungible. He'll use that to build the streets. So its the same. TIF's don't impact your tax bill. We use 75% of the increased tax generated to pay the bond, but 25% goes to the city. "This is my money, not the city's." It doesn't impact your tax bill. Without the project there's no increase so you can't say you could use the money for some other expense. You'll get to vote on the TIF. The public gets the streets. (Jesse Beck): We are also doing the new City Market and we did the garages at the airport and the hospital. The 160ft. height is only on half of the plot. Downtown is ready for this. We have setbacks after the 5th story. Q. Don't you have a wall on Cherry Street unlike the setbacks on Church Street? A. Setbacks vary with the city requirements. They are 60ft. on Church Street after 45 ft. The 45ft height gives Church St. a potential uniform wall on the west side. Planning and Zoning wanted this increase to 45 foot height to make it even. Q. Won't there be shading on the Cherry Street park? Can't you space out the towers more to minimize that? A. We are looking at that. New streets will also add street level sun. Check the CEDO website for particulars on setbacks. Q. Can you lower the height? The square feet on the top of the towers is only 8000 ft each or a total of 24,000 sq. ft. With 325,000 sq. ft. for the garage, putting it underground would let you lower the towers. It is hard to see that all 200,000 cubic yards of soil would be contaminated. Say half was. That would make removal and disposal cost \$60 million more for a project with underground parking. A. (Beck) At BTV the cost for above ground parking was 10,000-15,000 a space; at the hospital it was 42,000 a space.



(Sinex): \$21,000 above ground and \$55,000 below at present. We initially wanted it underground but the project can't sustain it financially. We wouldn't get the financing. Each garage floor is 10 ft. Q. Can't you reduce the number of parking spaces, put parking where the concourse presently is, sell some spaces, use shared space as per the downtown parking plan, and then you'd have 325,000 more square feet of space to rent. A. We looked at all those options. We can't get it to work. Our garage is as small as possible given the demand of our mix. Retail wants spaces We can't reduce the number of spaces without reducing the size of the project. Our UVM Medical tenants have 500 employees and want 500 spaces. We are trying to shift some of this to adjacent lots. Apartments want one space each. Then there's additional office space, then retail. Yes, we need smart parking management. Champlain College students won't be allowed to park downtown so that saves 80 spaces. We've studied this. You have peak demand at 1200 spaces and you have 925 slots. Valet parking can gain you 225 spaces. You build to 85% of the peak demand so you don't have unused spaces most of the year. We are stuck. Q. If you presume the soil is contaminated, won't rebuilding the streets involve removal of contaminated soil, and thus the TIF won't be sufficient? A. We will be adding soil to the streets, not removing it, We'll add 10,000 cu. yds.

6. Because of the late hour, Councilor Paul ceded her time and will report in October and we lacked time for "member items/open forum."
7. Meeting adjourned at 9 pm.

Respectfully submitted, Charles Simpson



Neighborhood Planning Assembly Agenda for the Wards 2 and 3

Thursday, September 8, 2016

McClure Multi-Generational Center/Champlain Senior Center, 241 N. Winooski Ave.

FREE Community Dinner at 5:30 pm

Facilitator: Ryan McLaren, Steering Committee

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6:30PM - Welcome & Introductions

6:35PM - Don Sinex, Burlington Town Center Project (40 mins)

7:15PM - Burlington Schools Update - Ward 2/3 School Commissioners (30 Mins)

7:30PM - North Avenue Pilot Project - Elizabeth Gohringer, Department of Public Works

7:45PM - George/Pearl Street Lofts Project Update - John Alden

8:00PM - Public Comment - Opportunity for residents to share comments on any topic and for suggestions for future NPA agendas (please limit any commentary to one minute)

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Current Steering Committee:

Infinite Culcleasure Ward 3, [infinite.culcleasure@gmail.com](mailto:infinite.culcleasure@gmail.com)

Fauna Hurley Ward 3, [faunashaw@gmail.com](mailto:faunashaw@gmail.com)

Ryan McLaren Ward 3, [ryan.d.mclaren@gmail.com](mailto:ryan.d.mclaren@gmail.com)

Barbara McGrew Ward, 3 [bmcgrew@aol.com](mailto:bmcgrew@aol.com)

Andrew Champagne Ward 2

Tony Redington Ward 2, [TonyRVT99@gmail.com](mailto:TonyRVT99@gmail.com)

Patrick Johnson Ward 2, [superdogirie@gmail.com](mailto:superdogirie@gmail.com)





## Neighborhood Planning Assembly Attendees

|                     |                       |                |                                  |                |                       |                |                       |           |                       |           |
|---------------------|-----------------------|----------------|----------------------------------|----------------|-----------------------|----------------|-----------------------|-----------|-----------------------|-----------|
| NPA<br>(choose one) | <input type="radio"/> | Wards<br>1 & 8 | <input checked="" type="radio"/> | Wards<br>2 & 3 | <input type="radio"/> | Wards<br>4 & 7 | <input type="radio"/> | Ward<br>5 | <input type="radio"/> | Ward<br>6 |
|---------------------|-----------------------|----------------|----------------------------------|----------------|-----------------------|----------------|-----------------------|-----------|-----------------------|-----------|

Date of Assembly : 9/8/16 Location: McClure Multi-

Please return to your convenor, \_\_\_\_\_,  
or email to [cedofd@burlingtonvt.gov](mailto:cedofd@burlingtonvt.gov)

|    |                           |    |
|----|---------------------------|----|
| 1  | <u>Eyan McLauren</u>      | 21 |
| 2  | <u>[Signature]</u>        | 22 |
| 3  | <u>R. St. [Signature]</u> | 23 |
| 4  | <u>Chester Sanford</u>    | 24 |
| 5  | <u>Sam Wilson</u>         | 25 |
| 6  | <u>Sharon Webster</u>     | 26 |
| 7  | <u>Sara Giannoni</u>      | 27 |
| 8  | <u>Lynn Martin</u>        | 28 |
| 9  | <u>Michael McCormick</u>  | 29 |
| 10 | <u>Tom Resnik</u>         | 30 |
| 11 | <u>Barbara Wynn</u>       | 31 |
| 12 | <u>Carolyn Bates</u>      | 32 |
| 13 | <u>Willi Peery</u>        | 33 |
| 14 | <u>Ann Peery</u>          | 34 |
| 15 | <u>Erica Spiegel</u>      | 35 |
| 16 |                           | 36 |
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## Neighborhood Planning Assembly Agenda for the Wards 2 and 3

Thursday, September 8, 2016

McClure Multi-Generational Center/Champlain Senior Center, 241 N. Winooski Ave.

Draft

Meeting start time: 6:40pm

Steering Committee member present: Infinite Culcleasure Ward 3; Fauna Hurley Ward 3; Barbara McGrew Ward 3; Ryan McLaren Ward 3; Tony Redington Ward 2; Patrick Johnson Ward 2

### **Don Sinex, Burlington Town Center Project- Liz Miller and Jesse Beck**

BTC presentation

Liz helps with Communication and Jesse is Project Architect. Presentation also on CEDO website.

<https://www.burlingtonvt.gov/CEDO/BTV-Mall-Redevelopment-Process>

Project doesn't own Macy People's and Free Press building.

The New St. Paul Street divides the project in two phases. St Paul, has mall retail, housing and office tower. The website has primary goals for housing, economic development in jobs, and wrap around services in the downtown. Housing has not been designated on what floor it will be on yet. Still looking at the inclusionary units and market housing location. There is a two floor tenant of UVM Medical Center. In phase one, the mall will be removed and has two levels of retail.

Phase two is under the ground. There's a 3<sup>rd</sup> party that developing a 3D walk through of the streets. The project will LEED Gold. DPW expectation that the property takes care of storm water and connect to City storm water. Have roof top water retention and solar power on the tower. 274 units 20% inclusionary 55, which is permanent affordable 80 units of Champlain College that yet to be negotiated; the rest is market rate. 160ft is the height. Overlay district allowed for this height and allows for another 15 for mechanical. The observation tower is part of the height and not part of the TIF. Right now at conceptual phase and if project gets voted in will go through Major Project review. Feasibility study is being developed but the office space would be what the market will bear.

### **Burlington District School Update-Brian Cina and Liz Curry**

Negotiation process but is at the end. Hope to reach an agreement to secure the tax payer's ability to pay and also continue to attract quality teachers. 2013-2016 is the current contract term.

Fact finding and negotiation details can be found on District website. Sept 12 will go into mediation.

<http://district.bsd.schoolfusion.us/modules/cms/pages.phtml?pageid=332596>

Living contract which pegs the teachers with the surrounding salary. Problem with this is if other district are paying higher it locks the district to pay similarly even if not fiscally able in the SBD budget. This set



The areas that set the union and district apart are; the District where salaries are set by other districts. Cannot longer sustain this. Looking to still have BSD teacher salary to still be at the midpoint range. Healthcare is a problem. Co-pay is 15% and asking to have teachers' pay more of the co-pay. Also teacher can take classes. This is 300k of budget. Looking to be more strategic with the class taken to be changed to meet the needs of students. The Superintendent hired a strong administration team and the beginning of the year has gone smooth. There is a committee that tracks student outcome and there's a diversity and equity committee. One thing implemented is a trauma training due to the needs of students. The school is moving forward to do Restorative Justice Practices in schools to not push students out.

#### **North Avenue Pilot Project-Senior Planner-Nicole Losche and Cindy Cook Public Outreach Consultant**

North Ave Pilot implemented in July and taking in all the adjustments based on feedback. Changes made were: reduced Bollards, created pull out for south bound bus next to Hannaford's, added additional sign bikers to ride alongside with cars. Still doing data collection and public engagement. Looking at bike count, collision reports, and City wide survey. There will public forum on Sept 20<sup>th</sup> 7pm in Miller Center. At City Council meeting on Oct. 17 DPW will give a report which as a 4month check in. This will give time if any changes need to be made can be done before winter. Biker education will continue. Ballers will be removed for the winter due to plowing and possibly sooner. As school resumes, DPW and CCRPC will continue to observe the corridor and collect data to assess additional morning traffic. Need to see how the pilot handles during school.

#### **George/Pearl Street Lofts Project Update-John Aldon and Julio**

Plan BTV is still calling for more housing. This projects fits into the targeted areas in the City for more infill areas and creating more density. Residential structures will be on George and Pearl. Former Bove's restaurant will be removed. Bove's is not a historical site but will memorialize through the story and history of Little Italy on an informational plaque infused with a video documentary. Will also preserve some items inside the restaurant such as the jukebox, pictures, and fixtures to bring to shop in Milton to have a little museum. One parking underground and one on ground. Project holds 62 apartment units which 20% is inclusionary housing. 3 story in front and 4 in back on George Street. There is outdoor bike parking and each housing unit has storage unit next to the garage. There will be some green strips that will be incorporated into the project but don't have much to work with because there is no room it's a pedestrian sidewalk. The construction timeline would be ahead of Burlington Town Center and hoping to start in late spring. Don't have to go through ACT 250 because this project is in a designated downtown and providing housing. The state passed this ruling for all downtown development projects. Will still need to go through the development review processes. This project is aiming at workforce housing and working with CEDO to see how to do this. The aim is to keep in middle to low income.

Meeting Adjourn: 8:52pm

Meeting Notes submitted by Phet Keomanyvanh-CEDO Community Development Specialist-Public Engagement

FIGURE 1-A



Ward 5 NPA  
DPW Conference Room, 645 Pine Street  
Tuesday 20, 2016 7:00 – 9:00 pm

7:00 - Opening Statements and Welcome Address.

7:05 - Safety in the Neighborhood. Lt. John Young, BPD.

7:20 - Burlington Town Center Presentation and Q+A. Don Sinex, Devonwood.

8:00 - City Market South End Update. Allison Weinhausen, Community Engagement, City Market.

8:30 - Open Forum and Closing.



FIGURE 1-A



## Neighborhood Planning Assembly Attendees

| NPA<br>(choose one) | Wards<br>1 & 8 | Wards<br>2 & 3 | Wards<br>4 & 7 | Ward<br>5 | Ward<br>6 |
|---------------------|----------------|----------------|----------------|-----------|-----------|
|---------------------|----------------|----------------|----------------|-----------|-----------|

Date of Assembly : 9/20/16 Location: DPW

Please return to your convenor, Phet,  
or email to [cedofd@burlingtonvt.gov](mailto:cedofd@burlingtonvt.gov)

- |    |                  |    |
|----|------------------|----|
| 1  | Sue Plisinski    | 21 |
| 2  | Tony Rowington   | 22 |
| 3  | BARBARA GAIDA    | 23 |
| 4  | Joseph Gaida     | 24 |
| 5  | Mark & Lynn      | 25 |
| 6  | Russell Aminzade | 26 |
| 7  | Jack Ward        | 27 |
| 8  | Phet Keomany     | 28 |
| 9  | Rebecca Galvin   | 29 |
| 10 | Marcia Gustafson | 30 |
| 11 | Justin Winrock   | 31 |
| 12 | Tom Winrock      | 32 |
| 13 | ANN TAYLOR       | 33 |
| 14 | Allison Wanhagen | 34 |
| 15 | ANDREW SIMON     | 35 |
| 16 | ELISA NELSON     | 36 |
| 17 | PAUL SMITH       | 37 |
| 18 |                  | 38 |
| 19 |                  | 39 |
| 20 |                  | 40 |



# Neighborhood Planning Assembly Minutes

NPA:  
(choose one)

| Wards | Wards | Wards | Ward     | Ward |
|-------|-------|-------|----------|------|
| 1 & 8 | 2 & 3 | 4 & 7 | <b>5</b> | 6    |

Date of Assembly : **9 / 20 / 2016**

Start Time: (Commence): **7:05 PM**

Location: **DPW Building, Pine St.**

Finish Time: (Adjourn): **9:05 PM**

Notetaker: **Nate Orshan**

Steering Committee Members in Attendance:

**Alec Bauer**  
**Elisa Nelson**  
**Nate Orshan**

## Discussion Topics and Action Items:

### (1) Safety in the Neighborhood - Lt. John Young, Burlington Police Department

Answered questions such as top South End calls to the BPD (#1: Issues with population of transient people; #2: Issues with motor vehicle use), the Department's approach to traffic violations, the outcome of recent de-escalation training, and more.

### (2) Presentation and Q & A: Burlington Town Center - Don Sinex, Managing Director, Devonwood Investors LLC, and Jesse Beck, President, Freeman French Freeman

Sinex delivered a presentation with a status report for and details about the proposed Burlington Town Center redevelopment project and answered attendee questions. The zoning amendment is in its final stages, with a City Council public hearing on September 29. When asked if a critical dependency such as the zoning amendment were not passed what Devonwood Investors would do, Sinex stated that they would still try to propose some development project, though the scope and nature of such a project would depend on timing.

### (3) Update: City Market South End - John Tashiro, General Manager, and Allison Weinhagen, Director of Community Engagement

Tashiro stated that the new store is on schedule for a Summer 2017 opening. Weinhagen shared details about recent Design Review Board meetings and developments that had occurred since their last presentation for the NPA. Among details shared were the fact that the City will not act to temporarily dead-end the streets along Briggs Street and the fact that City Market moved the entire footprint for the building two feet to the east (to accommodate vehicle entrances and exits from a single driveway) and three feet to the south (to accommodate a potential right-turn lane for the Champlain Parkway when it is finally built).

### (4) NPA Related Open Forum and Closing

Tony Redington announced that, at the next month's Ward 5 NPA meeting (Thursday, October 20) in addition to a presentation about the Burlington Town Center redevelopment project, the Coalition for a Livable City would be announcing a proposal to modify the plans for the Champlain Parkway.

### No action items.

Motion to adjourn adopted at 9:05 PM.





Location: UVM Medical Center, McClure Lobby Conference Room

Date: October 12, 2016

Time: 7.00 p.m.

Draft

7.00 p.m.: Welcome and Introductions

7.05: City Council Update

7.25: Speak Out: Including any election candidates who wish to be recognized - (no draft ballot yet so regrettably no customary "candidates' forum".)

7.45: A chance to meet newly appointed CEDO Director, Noelle MacKay, with a brief introduction and Q&A.

8.00: Devonwood Investors' presentation. Not clear if Don Sinex will be with us, but either Elizabeth Murray, Jesse Beck or Don Sinex, or a combination of all three, will join us to discuss the Town Center redevelopment, and entertain Q&A.

8.30: Coalition for a Liveable City: Genese Grill will offer a different perspective, with Q&A.

9.00: Close

Emily Lee, Ward 8 NPA Steering Committee

Dana Kamencik, Ward 1 NPA Steering Committee

Richard Hillyard, Ward 1 NPA Steering Committee

Parking: In the McClure Garage, free, courtesy of UVM MC.

FIGURE 1-A



## Neighborhood Planning Assembly Attendees

|                     |                                     |                |                          |                |                          |                |                          |           |                          |           |
|---------------------|-------------------------------------|----------------|--------------------------|----------------|--------------------------|----------------|--------------------------|-----------|--------------------------|-----------|
| NPA<br>(choose one) | <input checked="" type="checkbox"/> | Wards<br>1 & 8 | <input type="checkbox"/> | Wards<br>2 & 3 | <input type="checkbox"/> | Wards<br>4 & 7 | <input type="checkbox"/> | Ward<br>5 | <input type="checkbox"/> | Ward<br>6 |
|---------------------|-------------------------------------|----------------|--------------------------|----------------|--------------------------|----------------|--------------------------|-----------|--------------------------|-----------|

Date of Assembly : 12 Oct. 2016 Location: McClure Lobby Con

Please return to your convenor, Phet Keomanyvanh  
or email to [cedofd@burlingtonvt.gov](mailto:cedofd@burlingtonvt.gov)

|    |                        |    |
|----|------------------------|----|
| 1  | Ibnar Avilix Stratibus | 21 |
| 2  | Selene Colburn         | 22 |
| 3  | GENESE GRILL           | 23 |
| 4  | Charles Simpson        | 24 |
| 5  | Brian Cinal            | 25 |
| 6  | Maria McClellan        | 26 |
| 7  | Sandy Wynne            | 27 |
| 8  | Scott Kulpatnek        | 28 |
| 9  | Tyler Mitchell BFD     | 29 |
| 10 | Lauren Beriozberia     | 30 |
| 11 |                        | 31 |
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| 16 |                        | 36 |
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| 19 |                        | 39 |
| 20 |                        | 40 |



FIGURE 1-A



## Ward 1 and 8 NPA list serve

| Name                | Street | Phone Number | Email Address |
|---------------------|--------|--------------|---------------|
| Dana Hamenick       |        |              |               |
| Lisa Kingsbury      |        |              |               |
| Nkandu Gumbo        |        |              |               |
| Brian Cina          |        |              |               |
| Richard Hillier     |        |              |               |
| Maria McClellan     |        |              |               |
| Adele Hohentzserpan |        |              |               |
| Phat Keomany        |        |              |               |
| Erhard Mahnke       |        |              |               |
| Joe Spidel          |        |              |               |

FIGURE 1-A



## Ward 1 and 8 NPA list serve

| Name                | Street | Phone Number | Email Address | V |
|---------------------|--------|--------------|---------------|---|
| Mark Porter         |        |              |               |   |
| Lauren Berrizbeitia |        |              |               |   |
| Sharon Bushar       |        |              |               |   |
| Selene Colburn      |        |              |               |   |
| Ibnar A. Stratibus  |        |              |               |   |
| David Felsen        |        |              |               |   |
| Sandy Wynn          |        |              |               |   |
| Jessie Beck         |        |              |               |   |
| Liz Miller          |        |              |               |   |
| Scott Kilpatrick    |        |              |               |   |



FIGURE 1-A

Ashley Bond  
James Bond  
Peter Kaye 31  
Laurie + Mark Koto



Ward 1 and 8 NPA  
UVM Medical Center, McClure Lobby Conference  
October 12, 2016  
Draft

Steering Committee Members Present  
Richard Hillyard-Ward 1, Dana Kamencik-Ward 1.

Start time 7:04pm

### **City Council Updates**

Sharon Bushor-Ballots have Capital Plan and Tax Increment Financing(TIF) for overlay zoning to open up streets. Not supportive for some of traffic charter change due to the funds going into parking and feel that this should not be done through bonds. Went through lengthy process to change a zone from institutional to residential in order to protect the character, hoping that residential medium will go forward. A development is being built across the street of Fletcher Place. The development going through Development Review Board and Conservation Board. There are some concerns that the development is on a slope and might not hold due to the capacity of the project.

Selene Colburn – Did not support zoning changes and is glad to hear from the public about this zoning proposal change. There was support and favor for the project but not for the size of the project. Wish there was more of a conversation to reach a middle ground on compromising instead of a black or white yes or no. Sharon did a tremendous work with zoning review. Chair Development and Revitalization Committee is meeting on the 18<sup>th</sup> to review consultants from inclusionary zoning, the report has not been released by the administration. Originally was going to vote on TIF but a group petitioned to put zoning on the ballot too. If zoning doesn't pass, then we'll need to go back to the developer to work with existing zoning, although the developer has stated that this is the way the project will be. If TIF passes, the money will still be there to open up the streets. The current zoning does not allow to open up the streets.

Brian Cine - lives in Ward 2, but under Chittenden 6-4 due to redistricting. Cine wants to work on legislative level to apply background in social work to make public change, also currently on the School District Board.

Selene Colburn running for 6-4 Legislative District. Currently serving 2<sup>nd</sup> term in City Council, Librarian at UVM. Colburn wants to run on state level because hits some barriers of advocating for opiates recovery and limited access to mental health services on a municipal level. She also works on environmental and Housing issues.



### **Fire Department Bonds**

Chief Steven Locke- Item #1 is Capital bond and includes replacing 4 firetrucks. Trucks have over 100k and sometimes trucks are out of service and need to borrow trucks from South Burlington. Also waterline is unable to deliver water flow due to the rotting infrastructure. This inhibits the quality of services that can be delivered.

### **Community and Economic Development Office-CEDO**

Noelle MacKay- New CEDO Director. Her previous employer was with Smart Growth Vermont and also Commissioner of Housing and Community Development. In CEDO there is Community Justice Center which works with re-entry and Restorative Justice in schools. CEDO also supports projects such as Moran Plant and other development projects. MacKay has been doing CEDO chats to understand what's working and what's not with staff, past staff, Dept., and community partners. This will help understand what CEDO can do and should do. In CEDO there has been a history of creativity of community and economic development. CEDO has Burlington Lead Program (BLP) to make homes safer and more livable. This year hit 100 homes in BLP and looking at diversifying funding streams beyond grants. New Housing staff will start Nov. 1<sup>st</sup> and also recently filled in new finance staff too. Looking to ramp up communication, re-branding, and marketing. CEDO has three teams and each has Assistant Directors. The teams are Sustainable Housing and Economic Development (SHED), Community Housing and Economic Opportunity Programs (CHOP) and Community Justice Center (CJC). Housing is in all three Teams. TIF history has a long history of modification and change. The most recent is on the Town Center and Waterfront. Currently reviewing Consultant report on how inclusionary zoning has worked in other cities to making small changes and tweaks before releasing it to the public. Had a 3<sup>rd</sup> party to study a feasibility study and there is not a full ROI report to produce. Some of the information is confidential and developers need this information to produce intent letters. In terms of getting money worth there are several terms in the predevelopment agreement that need to be done first. On the CEDO website, there is information about what we are getting back.

There was a question for Noelle regarding the unallocated Community Development Block Grant (CDBG) money from last year and using it for the opioid crisis. After the NPA meeting Mary Esbjerg provided this answer to the question. "There are unallocated funds from our CDBG Program Years 2015 and 2016 which will be advertised along with CDBG funds for 2017 beginning in December 2016, with new grants being available July 2017. We will include, as an eligible activity, health-related projects with a focus on opiate addiction related services. The application process is an open and competitive one; all decisions are made by a citizen advisory group, presented to the Mayor and confirmed by City Council."

### **Devonwood-The zoning overlay shape and design**

Jesse Beck and Elizabeth Murray. Liz- Started last January when pre-agreement started. Jesse one of the Architect-Freeman French Freeman. Specialty has been doing complex projects such as the airport and statehouse so Beck is used to this size of development. Devonwood properties are Macy's to LL Bean, Old Parking Garage. Does not include Free Press and Bank building. The overlay district that was passed starts past lakeside garage and larger than Devon Wood Properties. Phase 1 will deconstruct the entire mall. Phase 2 will be small to medium retailers. In the upper level there will be a 3 level garage, housing, 2 floors for UVM Medical Center offices and a public terrace. New streets restored will be on St. Paul and Bank street. There will be 60ft wide street between phase 1 and 2. Height is 160ft. Free Press is 105

to offer some perspective of 160ft tower next to it. Project signed on to 2030 challenge to reduce energy consumption. Any TIF district has to have economic development that is produced from a project. Three million dollars will be generated from property taxes and 75% will go to paying it back in 15 years. Taxes will not go towards schools until TIF district is paid for. The developer has a Facebook and Twitter Feed. Search Burlington Downtown Redevelopment. Opinions differ but from the developer's point the City requested to reconnect city streets. To minimize risk and disruption the first phase will be away from Church Street. The permitting process will take 4 or 5 months which will go into 2017. Developer will have to get the project financing done and development agreement finalized with the City and Council. The development agreement will also show community benefit. Pieces will have job fair and housing. TIF is reimbursement to the developer for the public streets only. What you see now is conceptual design that will evolve when going through Development Review Board.

#### **Coalition for a Livable City (CLC)**

Genese Grill, Charles Simpson, Steve Goodwin. The 160ft and 105ft are not 4 stories than what Devonwood has claimed and is much higher. There are two items on ballot and if item 3 of the zoning gets voted down then CLC would like to offer consultant services to help develop a new project. If Mayor would work with community's vision of Plan BTV then it would be better project. The Mayor and Council promise developer TIF and Zoning change in the interest of developer. CLC is not against development but wants a more affordable and sustainable project. Glad to see that some of the parking can be wrapped but there are still three open floors. If we want more parking there is the suggestion to dig underground to reduce height. A sustainable idea is to look at less parking downtown and more on the need for an electric trolley system. Also the 80 student units should be eliminated from the project and these units should be on campus. The developer needs streets for the plan not for public connectivity. The developer should pay for the streets not the taxpayers. What happens to TIF is taxes are frozen and 100% goes to pay bond holder and will continue for the life of the TIF. There has never been a developer in history that has the tax payer pay public streets. They are asking voters to make a decision but numbers are not available. The Business Associate hired a lobbying to advocate for ballot items. CLC filed a Freedom of information Act for the feasibility report but was denied.

9:20 pm End

Notes submitted by Phet Keomanyvanh  
Community Development Specialist-CEDO



Neighborhood Planning Assembly Agenda for the Wards 2 and 3  
Thursday, October 13, 2016  
McClure Multi-Generational Center/Champlain Senior Center, 241 N. Winooski  
Ave.

FREE Community Dinner at 5:30 pm  
Facilitator: Ryan McLaren, Steering Committee

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6:30PM - Public Comment Period- Opportunity for residents to share comments  
on any topic and for suggestions for future NPA agendas (please limit any  
commentary to one minute)  
6:35PM - BTV Great Streets Initiative, Kirsten Merriman Shapiro, CEDO (10mins)  
6:45PM - Burlington Town Center Project, Don Sinex (15mins)  
7:00PM - Crosswalk Improvements on North Avenue, Martin Lee, DPW (10  
mins)  
7:10PM - Mayor Miro Weinberger, November Ballot Initiatives (20mins)  
7:30PM - Fire Department Bond Initiatives - Chief Steven Locke, BFD, Michael  
Curtin BFFA President (15mins)  
7:45PM - Dan Albrecht, CCRPC Brownfields Program: Site planning Assessment  
and Cleanup Planning Assistance. (15mins)

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Current Steering Committee:  
Infinite Culcleasure Ward 3 [infinite.culcleasure@gmail.com](mailto:infinite.culcleasure@gmail.com)  
Fauna Hurley Ward 3 [faunashaw@gmail.com](mailto:faunashaw@gmail.com)  
Ryan McLaren Ward 3 [ryan.d.mclaren@gmail.com](mailto:ryan.d.mclaren@gmail.com)  
Barbara McGrew Ward 3 [bmcgrew@aol.com](mailto:bmcgrew@aol.com)  
Andrew Champagne Ward 2  
Tony Redington Ward 2 [TonyRVT99@gmail.com](mailto:TonyRVT99@gmail.com)  
Patrick Johnson - [superdogirie@gmail.com](mailto:superdogirie@gmail.com)

FIGURE 1-A



## Neighborhood Planning Assembly Attendees

| NPA<br>(choose one) | Wards<br>1 & 8 | Wards<br>2 & 3 | Wards<br>4 & 7 | Ward<br>5 | Ward<br>6 |
|---------------------|----------------|----------------|----------------|-----------|-----------|
|---------------------|----------------|----------------|----------------|-----------|-----------|

Date of Assembly : 10-13-16 Location: McClure Multi-Gen

Please return to your convenor, Phet Keomanyvanh,  
or email to [cedofd@burlingtonvt.gov](mailto:cedofd@burlingtonvt.gov)

1 Catherine LaPenta

2 Nate Benner

3 Emily LaPenta

4 Sam Miller

5 Sharon Webster

6 Harry Appelgate

7 Rosie Blick

8 Rosemary Ringer

9 Aloyse Rowley

10 Carole Langlois

11 David Palmer

12 Joan Palmer

13 Melissa Cain

14 Max Tracy

15 Gideon Turner

16 Gerald Gower

17 ~~Out~~

18 Patrick Johnson

19 Roger Letowitz

20 Barbara McGrew

21 Jack Daggitt

22 Jean O'Sullivan

23 Robert Herendeen

24 Barbara Wysocki

25 Charlie Moring

26 Michael McDonnell

27 Peo DeFranco

28 Lynn Martin

29 Genese Grill

30 Amy Prenowitz

31 Jane Knodel

32 Tony Bonin

33 Carol Spivey

34 Benjamin L.

35 Chelsea Sanford

36 Robert Strube

37 Andrew Champagne

38

39

40





Neighborhood Planning Assembly Agenda for the Wards 2 and 3  
Thursday, October 13, 2016  
McClure Multi-Generational Center/Champlain Senior Center, 241 N. Winooski Ave  
Draft

Steering Committee Present: Ryan McLaren Ward 3, Barbara McGrew Ward 3, Andrew Champagne Ward 2, Tony Redington Ward 2, Patrick Johnson Ward 2

Start time 6:30pm

**Public Comment**

Tony Redington-redesign for Champlain Parkway meeting will be held in early Nov. The meeting will work on bringing a proposal to bring to Mayor. The proposal will reduce parkway cost by 25% and will include 2 acres of land for business innovation and 2 acres for preservation.

Bill Diaz-Chaplin of VFW of Winooski. Consider supporting veterans, help improve their lives and get to know the people who served this country.

**BTV Great Streets Initiative, Kirsten Merriman Shapiro, CEDO**

Project will improve corridor in main street and city hall park. Public meeting will be held on November 16<sup>th</sup>, 6:30pm, City Hill in Contois Hall. Great Street has a website where the public can leave comments <http://greatstreetsbtv.com/> This project started out of 18+ different plans and taking all the planning processes over the 5+ years and making it into one great plan. Parts of the plan is to standardize storm water and curb extension depending on locations. The plans need to add to vibrancy, walkability, durability, functional and keep in state and federal standards. These are the standards that will be developed over months and be done by January 2017. This is 6 block project.

**Burlington Town Center Project, Don Sinex**

City Council passed the zoning law amendment creating a new an overlay district. Mayor decided to place this zoning law on the ballot as question for the voters to decide. Overall felt that this is a good decision because this brings a conclusion and this will be a firm decision. The zoning is a good thing for unique projects. When developer buy a piece of real estate they start from a framework and working with the City there will be other factors that come up such as the two public streets. This becomes a process to redesign. There is no plan B for this project. This project has been worked on for two years. If the Tax Increment Finance does not pass, then the public streets won't happen. The cost of an underground garage and removal of soil will be 3x times more in cost to develop the project. Looking at using some of the existing garage to offset the height. This project has multiple uses and will generate

revenue. Timing of financing is good and this is a low interest rate. In the project there is 55 Affordable units. This is only rental housing. Efficiencies are studios one bed room and two bed-room. This project will be Gold LEED, sustainable and the design will still need to go through DRB.

### **Crosswalk Improvements on North Avenue, Martin Lee and Roger Dickerson**

This project is funded 80% by VTrans and 20% by the City 20%. New crosswalks are on Wards St., North Ave and Village Green, Gosse Court and Green Acres Drive. Project is developing a conceptual plan and there will be a public process. At the top of Ward St. on North Ave. crosswalk will have a safer crossing. Will install flashing beacons on both sides of N. Ave. Will also have a curb extension which will provide a better line of sight (20ft) and minimize parking next to the crosswalk. On the other streets further down North Ave. will also install yield markings to yield to pedestrians. There are two locations that are going to have more intense pedestrian crosswalk. This is not new technology. Federal Highway has been established for these types of devices.

### **Mayor Miro Weinberger, November Ballot Initiatives**

There are 6 items on the local ballot but going to talk about 4 ballot items. 1<sup>st</sup> is general bond, 2<sup>nd</sup> is water infrastructure bond, 3<sup>rd</sup> is new zoning for downtown core, and 4<sup>th</sup> is 21 million in Tax Increment Financing (TIF). Ballot 1 and 2 are focused on infrastructure. The water infrastructure is 75 years old. 6 firetrucks are old and also need to finish bike path. This is a 50-million-dollar plan. 1 needs a 67% yes vote to pass. The City will not be coming back for more bonding for at least 5 years. Although there is some uncertainty around storm water because there are regulatory changes and this does not include the schools because they are separate from the City's budget. Memorial Auditorium is not part of this capital bond. Before doing bonds for Memorial we will need to have public process on how we will want to know what we want to do with this space. Items 3 and 4 is about the downtown core. #4 is TIF investment. Feel this is a rare and outstanding opportunity for the City. Property there now is a 70's declining mall that is not keeping up with the commerce side. From the project there will be an increase of retail, keeping well-paying jobs here, and create a massive revenue to city and state. Project will have environmental benefits will need to be green LEED Gold, heating and cooling is more efficient, also there will be less vehicle trips for those living down town will lower carbon foot print. This is a huge win for affordability and this keeps inclusionary zoning in place forever. Burlington has used TIF to change for the better such as in the Waterfront district. If it gets to the final development agreement with the developer, what will come out is a new operation run out of the City for people from all backgrounds to get job training. If voted yes, we will have to flesh out final agreements and the project still needs go through DRB. This year the City double the Housing Trust Fund to have families stay in the homes. The City was instrumental in the creation of Bright Street Housing and will continue to support affordable housing. 2 years ago the project did not have storm water management, public streets, livable wage jobs. TIF will cover 8 blocks all will be broadly public infrastructure.

### **Fire Department Bond Initiatives - Chief Steven Locke, BFD**

Chief Steven Locke- Item #1 is Capital bond and includes replacing 4 firetrucks. Trucks have over 100k and sometimes trucks are out service and need to borrow trucks from South Burlington. Also Item 2 of the waterline is unable to deliver water flow due to the rotting infrastructure. This inhibits the quality of services that can be deliver.



**Dan Albrecht, CCRPC Brownfields Program**

Chittenden County Regional Planning Commission (CCRPC) administers the Brownfield Program that offer site planning assessment and cleanup planning assistance for properties that are vacant or underutilized because of potential petroleum or hazardous substance contamination. CCRPC can assist property owners and potential developers by conducting environmental studies and/or draft site clean-up plans and cost estimates. Help identify sources of potential funding to clean up and redevelop the property to provide assurance to redevelop in urban environment. For more information, contact Dan Albrecht 802-861-0133 or [dalbrecht@ccrpcvt.org](mailto:dalbrecht@ccrpcvt.org)  
<http://www.ccrpcvt.org/>

**Coalition for a Livable City**

Video-Google Earth perspective of development not the overlay.

The people that are saying yes on 3 and 4 are saying they can't get LEED, storm water management, affordable housing without this project. In the past Bernie Sanders wanted to build on the waterfront and this got voted down and out of this the public got what we have today, a better waterfront project. This is a bad deal for affordable housing and misuse of TIF funding. Traditionally the developer pays for their own streets. Once this is voted down the CLC will offer its contracting services to the developer. CLC is made up of professional; engineers, graphic designers, lawyers, and teachers. Having TIF go towards building the streets is a misuse where it should be going to helping to improve other infrastructure in the city. There are two types of Affordable housing; one is section 8 and then one is inclusionary housing. With existing projects there is 2500 units and only affordable 500 units of subsidies units. Most of what the Mayor is talking about is inclusionary. We want to see more affordable housing for families and seniors. TIF is not bad but in this way it's going to be for the developer to pay for his road. There was a feasibility study done and all the numbers are adapted. It might be feasible but the public doesn't have the numbers. Without the numbers the public can't be informed to vote on the TIF. Filed for Freedom of information Act but was denied. Middle class and poor people are being driven out of the City. This is a small City and there will also be gentrification of local business too. CLC will be canvassing and has a Facebook page. [www.clcburlington.org](http://www.clcburlington.org)

End time 9:10pm

Notes submitted by Phet Keomanyvanh

Community Development Specialist-CEDO



**LEED v4 - Building Design and Construction - New Construction (Not Schools or Health Care)**

Updated: December 1, 2016

Project Name: Burlington Town Center

Phase:

| Quality  | Phase  | Title, [Available Points]                                                                                                                    | Team / Comments                                                                                                                                                   |
|----------|--------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes ? No |        |                                                                                                                                              |                                                                                                                                                                   |
| Y        | Design | <b>Minimum Program Requirements</b>                                                                                                          | <b>Architect</b><br>Project is permanent on existing land and complies with size requirements. Design team to establish LEED boundary. [No Form Required?]        |
| Y        | Design | <b>Project Information</b>                                                                                                                   | <b>Architect</b><br>Establish systems narrative and occupancy counts. Design documentation upload at design completion.                                           |
| 1 0 0    |        | <b>Integrative Process (IP)</b>                                                                                                              | 1 Point Possible                                                                                                                                                  |
| 1        | Design | <b>IPc1 Integrative Process [1]</b><br>Perform and document discovery and implementation on Energy-Related Systems and Water-Related Systems | <b>Full Team</b><br>Recommend charrette and exploration of impacts of various building orientations. Having CM on board already will help us achieve this credit. |
| 9 5 2    |        | <b>Location and Transportation</b>                                                                                                           | 16 Points Possible                                                                                                                                                |

**Option 1: LEED for Neighborhood Development Location**

|                            |        |                                                                                                                                                                                                                                                                                                            |                                                                              |
|----------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Not Applicable, Use Opt. 2 | Design | <b>LTc1 LEED for Neighborhood Development Location [16]</b><br>Locate the project within the boundary of a development certified under LEED for Neighborhood Development (Stage 2 or Stage 3 under the Pilot or 2009 rating systems, Certified Plan or Certified Project under the LEED v4 rating system). | <b>None in Vermont- Not Applicable</b><br>Using Option 2- Individual Credits |
|                            |        |                                                                                                                                                                                                                                                                                                            |                                                                              |

**Option 2: Individual Credits**

|     |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
|-----|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Design | <b>LTc2 Sensitive Land Protection [1]</b><br>Option 1: Locate the footprint on land that has been previously developed.<br>Option 2: Locate footprint on land that meets these criteria:<br>* Not prime farmland of statewide or local importance<br>* Not within a 100 year floodplain<br>* Not a threatened, imperiled or endangered species habitat<br>* Not within 100 feet of a water body<br>* Not within 50 feet of a wetland except for minor improvements                                                 | <b>Architect</b><br>Previously developed site, this point is a given, easy documentation                                                                                                                                           |
| 1 1 | Design | <b>LTc3 High-Priority Site [1-2]</b><br>Option 1: Locate on an infill location in a historic district. [1]<br>Option 2: Locate in a nationally recognized priority zone. [1]<br>Option 3: Located on a brownfield site where soil or groundwater contamination has been identified and where the AHJ requires its remediation. Perform remediation. [2]                                                                                                                                                            | <b>Architect</b><br>Determine if we meet the requirements of options 1 or 2.                                                                                                                                                       |
| 3 2 | Design | <b>LTc4 Surrounding Density and Diverse Uses [1-5]</b><br>Category 1: Locate on a site with a surrounding existing density of at least 22,000 SF/acre [2pts] or 35,000 SF/acre [3] within a 1/4 mile radius of the project boundary. AND/OR<br>Category 2: Construct or renovate a building or a space within a building such that the building's main entrance is within a 1/2-mile walking distance of the main entrance of four to seven [2] or eight or more [3] existing and publicly available diverse uses. | <b>Architect</b><br>We will get points for redeveloping a previously developed site and for access to transportation resources. The "maybe" points depend on whether we can count this as a redevelopment of more than one site or |



FIGURE 2-A

| Qualify  | Phase  | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Team / Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes ? No |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3 2      | Design | <b>LTc5 Access to Quality Transit [1-5]</b><br>Locate any functional entry of the project within a 1/4-mile walking distance of existing or planned bus, streetcar, or rideshare stops with minimum 72 daily weekday trips (see reference guide).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Architect</b><br>One of the few sites in Vermont where this credit is achievable.                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1        | Design | <b>LTc6 Bicycle Facilities [1]</b><br>Design or locate the project such that a functional entry or bicycle storage is within a 200-yard walking distance or bicycling distance from a bicycle network that connects to at least one of the following:<br>* at least 10 diverse uses (see reference guide Appendix 1)<br>* a school or employment center, if project floor area 50% or more residential<br>* a bus rapid transit stop, light or heavy rail station, commuter rail station, or ferry terminal<br>All destinations must be within a 3-mile (4800-meter) bicycling distance of the project boundary                                                                                                                                                                                                                                | <b>Architect</b><br>We will need to provide covered bicycle parking for residential units and shower facilities accessible to retail and office employees working in the building. <b>The entrance to the bike parking needs to be within 200yds of the new transit center at Cherry and St. Paul.</b>                                                                                                                                                                                            |
| 1        | Design | <b>LTc7 Reduced Parking Footprint [1]</b><br>Do not exceed the minimum local code requirements for parking capacity.<br>Provide parking capacity that is a percentage reduction below the base ratios recommended by the Parking Consultants Council, as shown in the Institute of Transportation Engineers' Transportation Planning Handbook, 3rd edition, Tables 18-2 through 18-4                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Architect, Civil, Landscape</b><br>We are providing more parking than the zoning requirement and are therefore ineligible for this point.                                                                                                                                                                                                                                                                                                                                                      |
| 1        | Design | <b>LTc8 Green Vehicles [1]</b><br>Designate 5% of all parking spaces used by the project as preferred parking for green vehicles. AND<br>Option 1. Electric Vehicle Charging: Install Level 2 electrical vehicle supply equipment (EVSE) in 2% of all parking spaces used by the project.<br>Option 2. Liquid, gas, or battery facilities: Install liquid or gas alternative fuel fueling facilities or a battery switching station capable of refueling a number of vehicles per day equal to at least 2% of all parking spaces                                                                                                                                                                                                                                                                                                               | <b>Architect, Civil, Landscape</b><br>This version of LEED does require Level 2 Charging stations (220/240v charging). Potentially partner with BED to offer street parking with chargers. LEED site boundary will need to include these spaces and they will need to be quantified as "spaces used by the project". <b>2% of 815 spaces results in 9 charging stations serving 2 spaces each. It may be possible to provide a mix of 240v rapid charging stations and standard 110v outlets.</b> |
| 4 4 2    |        | <b>Sustainable Sites (SS)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>10 Points Possible</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Y        | Const. | <b>SSp1 Construction Activity Pollution Prevention</b><br>Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent.                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Civil</b><br>Assume General Construction Permit from requirements State will be most stringent. Civil engineer to verify.                                                                                                                                                                                                                                                                                                                                                                      |
| 1        | Design | <b>SSc1 Site Assessment [1]</b><br>Complete and document a site survey or assessment that includes the following information: topography, hydrology, climate, vegetation, soils, human use, human health effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Landscape Architect, Civil, Architect</b><br>Create site diagram as part of concept design. By EV and SE Group                                                                                                                                                                                                                                                                                                                                                                                 |
| 2        | Design | <b>SSc2 Site Development - Protect or Restore Habitat [1-2]</b><br>Preserve and protect from all development and construction activity 40% of the greenfield area on the site (if such areas exist). AND<br>Option 1. On-Site Restoration (Previously Disturbed): Using native or adapted vegetation, restore 30% (including the building footprint) of all portions of the site identified as previously disturbed [2]<br>Option 2. Financial Support: Provide financial support equivalent to at least \$0.40 per square foot for the total site area (including the building footprint). Financial support must be provided to a nationally or locally recognized land trust or conservation organization within the same EPA Level III ecoregion or the project's state. The land trust must be accredited by the Land Trust Alliance. [1] | <b>Landscape Architect, Civil</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

FIGURE 2-A

| Quality  | Phase  | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Team / Comments                                                                                                                                                                                                                                                                                                                                         |
|----------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes ? No |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                         |
| 1        | Design | <b>SSc3 Open Space [1]</b><br>Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Landscape Architect, Civil, Owner</b><br>Note 25% vegetated requirement; this would require an extensive amount of green roof. We consider this unlikely.                                                                                                                                                                                            |
| 3        | Design | <b>SSc4 Rainwater Management [2-3]</b><br>Option 1. Percentile of Rainfall Events<br>* Path 1. 95th Percentile: In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 95th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure. [2]<br>* Path 2. 98th Percentile: Same as Path 1 but for the 98th percentile of rainfall events.<br>* Path 3. Zero Lot Line projects only - using green infrastructure and low-impact development, manage 100% of runoff from 85th percentile rainfall event on site through infiltration, evapotranspiration, or capture and reuse. [3]<br>Option 2. Natural Land Cover Conditions: Not applicable to project | <b>Civil</b><br>Path 3 may be achievable with infiltration in combination with green roofs, pourous paving, and planter boxes. Explore infiltration potential.                                                                                                                                                                                          |
| 2        | Design | <b>SSc5 Heat Island Reduction [1-2]</b><br>Option 1. Nonroof and Roof: Provide a total amount of non-roof measures and high-reflectance roof as per formula in reference guide [2]<br>Option 2. Parking under Cover: Place a minimum of 75% of parking spaces under cover [1]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Landscape Architect, Civil, Architect</b><br>Between PV systems, light colored membranes, and green roofs, this credit should be achievable. The SRI and color of pervious play surface for the Daycare must take this credit into account but there should be a compliant play surface solution.                                                    |
| 1        | Design | <b>SSc6 Light Pollution Reduction [1]</b><br>Meet uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method or the calculation method. Projects may use different options for uplight and light trespass. See reference guide for detailed requirements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Landscape Architect, Civil, Electrical</b><br>During concept design, establish the methods that will be used to address uplight and trespass. Establish the lighting zone of the project property. SE Group will need to provide additional photometrics beyond requirements for zoning compliance in order to document compliance with this credit. |
| 4        | 3      | <b>Water Efficiency (WE)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>11 Points Possible</b>                                                                                                                                                                                                                                                                                                                               |
| Y        | Design | <b>WEp1 Outdoor Water Use Reduction</b><br>Option 1. (Always use) Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Landscape Architect</b><br>Have always achieved this credit on Vermont projects. Install no permanent irrigation systems. Hose bibs are OK.                                                                                                                                                                                                          |
| Y        | Design | <b>WEp2 Indoor Water Use Reduction</b><br>For the fixtures and fittings listed in Table 1, as applicable to the project scope, reduce aggregate water consumption by 20% from the baseline. Base calculations on the volumes and flow rates shown in Table 1. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled. Install appliances, equipment, and processes within the project scope that meet the requirements listed in the requirement tables.                                                                                                                                                                                                                               | <b>Plumbing</b><br>This has not been difficult to achieve on past projects. Baseline is minimally code compliant fixtures (e.g. baseline assumes such things as 1.6gpf toilets) Possibly more complicated with private residential use, but we must achieve this water use reduction.                                                                   |
| Y        | Design | <b>WEp3 Building-Level Water Metering</b><br>Install permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated. Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. This commitment must carry forward for five years or until the building changes ownership or lessee.                                                                                                                                                                                   | <b>Plumbing</b><br>Building level metering required by city, no issue here.                                                                                                                                                                                                                                                                             |
| 2        | Design | <b>WEc1 Outdoor Water Use Reduction [1-2]</b><br>Option 1. (Always use) Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period. [2]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Landscape Architect</b><br>Have always achieved this credit on Vermont projects. Install no permanent irrigation systems. Hose bibs are OK.                                                                                                                                                                                                          |



FIGURE 2-A

| Qualify |    | Phase | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                            | Team / Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|---------|----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes     | ?  | No    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
| 1       | 2  | 3     | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       | <b>WEc2 Indoor Water Use Reduction [1-6]</b><br>Further reduce fixture and fitting water use from the calculated baseline in WE Prerequisite Indoor Water Use Reduction AND Appliance and Process Water. Install equipment within the project scope that meets the minimum requirements in Table 2, 3, 4, or 5. One point is awarded for meeting all applicable requirements in any one table. All applicable equipment listed in each table must meet the standard. | <b>Plumbing</b><br>Make further improvements over baseline described in WEp3. 25% improvement = 1 point, 30%=2points, each 5% increase is one more point up to 50% reduction/ 6 points                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                  |
| 1       | 1  |       | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       | <b>WEc3 Cooling Tower Water Use [1-2]</b><br>Conserve water used for cooling tower makeup while controlling microbes, corrosion, and scale in the condenser water system. See reference guide.                                                                                                                                                                                                                                                                       | <b>Mechanical</b><br>Review requirements for any methods that may add significant project cost. Note methods of reducing cooling tower water use generally have associated operating cost savings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                  |
|         | 1  |       | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       | <b>WEc4 Water Metering [1]</b><br>Install permanent water meters for two or more of the following water subsystems, as applicable to the project: Irrigation, Indoor plumbing fixtures and fittings, Domestic hot water, Boiler over certain size (see reference guide), reclaimed water, other process water.                                                                                                                                                       | <b>Plumbing</b><br>Incorporate metering into BOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                  |
| 20      | 11 | 2     | <b>Energy &amp; Atmosphere (EA)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 33 Points Possible                                                                                                                               |
| Y       |    |       | Const.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>EAp1 Fundamental Commissioning of Building Energy Systems</b><br>Commission mechanical, electrical, plumbing, and renewable energy systems and assemblies. Prerequisite requirements for exterior enclosures are limited to inclusion in the owner's project requirements (OPR) and basis of design (BOD), as well as internal 3rd party review of the OPR, BOD and project design.<br>Develop the OPR. Develop a BOD. CxA must review OPR, BOD and design; develop and implement a Cx plan and confirm requirements incorporated into construction documents; develop construction checklists; develop system test procedures; verify tests execution; maintain an issues log; prepare a final report.<br>Cx to report directly to the owner throughout the process.<br>Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently. | <b>Owner</b><br>Provide project OPR inclusive of enclosure requirements.<br>Contract systems commissioning agents prior to 30% design completion |
| Y       |    |       | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>EAp2 Minimum Energy Performance</b><br>Option 1. Demonstrate an improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.), using a simulation model. [For Retail projects see exception.]<br>Option 2. Prescriptive Compliance: ASHRAE 50% Advanced Energy Design Guide<br>Option 3. Prescriptive Compliance: Advanced Buildings™ Core Performance™ Guide                                                                                                                                                                                                                                           | <b>Mechanical</b><br>Establish energy model (Option 1)                                                                                           |
| Y       |    |       | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>EAp3 Building Level Energy Metering</b><br>Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption.<br>Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification. At a minimum, energy consumption must be tracked at one-month intervals.<br>This commitment must carry forward for five years or until the building changes ownership or lessee.                                                                                                                                                                                                                                                                                                                                      | <b>Mechanical, Owner</b>                                                                                                                         |
| Y       |    |       | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
|         |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>EAp4 Fundamental Refrigerant Management</b><br>Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems.<br>Existing small HVAC&R units (containing less than 0.5 pound) and other equipment, such as standard refrigerators and small water coolers are exempt.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Mechanical</b><br>Design and select equipment without CFC refrigerants                                                                        |

FIGURE 2-A

| Quality |   | Phase  | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Team / Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------|---|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes     | ? | No     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 6       |   | Const. | <b>EAc1 Enhanced Commissioning [2-6]</b><br><br>Option 1. Enhanced Systems Commissioning<br>Path 1. In addition to the Fundamental Building Commissioning prerequisite, the CxA must do the following:<br>Review contractor submittals; Verify inclusion of systems manual requirements in construction documents; Verify inclusion of operator and occupant training requirements in construction documents; Verify systems manual updates and delivery; Verify operator and occupant training delivery and effectiveness; Verify seasonal testing; Review building operations 10 months after substantial completion; Develop an on-going commissioning plan.<br>Include all enhanced commissioning tasks in the OPR and BOD. [3]<br>Path 2. Achieve Path 1 AND Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems. [4] AND/OR<br>Option 2. Envelope Commissioning. 3rd party external CxA must perform the required design reviews and complete the following commissioning process (CxP) activities for the building's thermal envelope in accordance with ASHRAE Guideline 0-2005 and the National Institute of Building Sciences (NIBS) Guideline 3-2012, Exterior Enclosure Technical Requirements for the Commissioning Process, as they relate to energy, water, indoor environmental quality, and durability.<br>Review contractor submittals; Verify inclusion of systems manual requirements in construction documents; Verify inclusion of operator and occupant training requirements in construction documents; Verify systems manual updates and delivery; Verify operator and occupant training delivery and effectiveness; Verify seasonal testing; Review building operations 10 months after substantial completion; Develop an on-going commissioning plan. [2] | <b>Owner</b><br><br>Confirm intent and contract CxA (Systems Commissioning Authority) and BeCxA (Building Envelope Commissioning Authority) prior to 30% design documentation. Note that BECx is one path for energy code compliance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 10      | 6 | 2      | Design                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Mechanical, Electrical</b><br><br>[Note that percentage here is inclusive of assumed 10% building energy solar system as part of project and that the baseline is ASHRAE 90.1-2010 Zone 6. This represents a significant energy use reduction for the baseline comparison compared to LEED v3.]<br>Establish energy performance target.<br>Complete Integrative Process credit energy analysis.<br>Create first draft energy model based on 30% Design Documents [to discuss].<br>An energy model will be required to demonstrate energy code compliance based on current % fenestration. Burlington Electric will provide targeted incentives based on the model. The PV produced energy counts as "energy saved" for this credit. Simply meeting VT energy code will earn us some additional points. Design to a low lighting power density and select mechanical equipment that has favorable cost/efficiency ratios (quick paybacks). |



FIGURE 2-A

| Quality  | Phase  | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Team / Comments                                                                                                                                                                                                                                                                                                                                                                           |
|----------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes ? No |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                           |
| 1        | Design | <p><b>EAc3 Advanced Energy Metering [1]</b></p> <p>Install advanced energy metering for all whole-building energy sources used by the building and any individual energy end uses that represent 10% or more of the total annual consumption of the building.</p> <p>The advanced energy metering must have the following characteristics: Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location; Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate; The data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure; The system must be capable of storing all meter data for at least 36 months; The data must be remotely accessible; All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p><b>Mechanical, Electrical</b></p> <p>This dovetails with municipal/ Burlington Electric Department goals for green infrastructure. Discuss incentives and cost-sharing with BED. Individually meter residential units and consider individually metering each tenant rather than including electrical use in leases- this strategy may help earn additional LEED points elsewhere.</p> |
| 2        | Const. | <p><b>EAc4 Demand Response [1-2]</b></p> <p>Case 1. Demand Response Program Available:<br/>Participate in an existing demand response (DR) program. Design a system with the capability for real-time, fully-automated DR based on external initiation by a DR Program Provider. Semi-automated DR may be utilized in practice. Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of the estimated peak electricity demand as determined under EA Prerequisite Minimum Energy Performance. Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event. Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan. [2]</p> <p>Case 2. Demand Response Program Not Available:<br/>Provide infrastructure to take advantage of future demand response programs or dynamic, real-time pricing programs. Install interval recording meters with communications and ability for the building automation system to accept an external price or control signal. Develop a comprehensive plan for shedding at least 10% of building estimated peak electricity demand as determined under EA Prerequisite Minimum Energy Performance. Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan. Contact local utility representatives to</p> | <p><b>Electrical, Owner, Utility</b></p> <p>A demand response program is available from both BED and Vermont Gas; discuss incentives and implementation with these utilities.</p>                                                                                                                                                                                                         |
| 2        | Design | <p><b>EAc5 Renewable Energy Production [1-3]</b></p> <p>Use renewable energy systems to offset building energy costs. The use of solar gardens or community renewable energy systems is allowed if both: The project owns the system or has signed a lease agreement for a period of at least 10 years; The system is located with the same utility service area as the facility claiming the use.</p> <p>Credit is based on the percentage of ownership or percentage of use assigned in the lease agreement.</p> <p>1 1% of total building energy cost offset</p> <p>1 5% of total building energy cost offset</p> <p>1 10% of total building energy cost offset</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p><b>Owner, Electrical</b></p> <p>We will need an energy model to predict building energy use in order to understand the % we will generate with the PV array. Note that PV generated power gets double counted as energy use reduction in EA c1.</p>                                                                                                                                    |
| 1        | Design | <p><b>EAc6 Enhanced Refrigerant Management [1]</b></p> <p>Option 1. No Refrigerants or Low-Impact Refrigerants: Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50.</p> <p>Option 2. Calculation of Refrigerant Impact: Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&amp;R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. See reference guide for calculation.</p> <p>[See additional requirements for Retail uses.]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p><b>Mechanical</b></p> <p>For base building systems and residential units, obtain refrigerant info for all</p>                                                                                                                                                                                                                                                                          |

FIGURE 2-A

| Quality  | Phase    | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Team / Comments                                                                                                                                                                                                                    |
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| Yes ? No |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                    |
| <b>2</b> | Const.   | <b>EAc7 Green Power and Carbon Offsets [1-2]</b><br>Engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specify the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Owner</b><br>This credit represents the possibility to purchase RECs on the market. We advise using this credit as a backup in case the review of our submission does not return the minimum of 60 points needed for LEED Gold. |
| <b>4</b> | <b>7</b> | <b>Materials &amp; Resources (MR)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>13 Points Possible</b>                                                                                                                                                                                                          |
| <b>Y</b> | Design   | <b>MRp1 Storage &amp; Collection of Recyclables</b><br>Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Owner, Architect, Civil</b><br>Provide standard waste handling procedures that will be used at this facility.                                                                                                                   |
| <b>Y</b> | Const.   | <b>MRp2 Construction and Demolition Waste Management Planning</b><br>Develop and implement a construction and demolition waste management plan to establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent. Specify whether materials will be separated or commingled and describe the diversion strategies planned for the project. Describe where the material will be taken and how the recycling facility will process the material.<br>Provide a final report detailing all major waste streams generated, including disposal and diversion rates.<br>Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Specifications, Contractor</b><br>Specify CDWM requirements.<br>Contractor to develop, submit, implement and track CDWM plan.<br><b>Note this was previously a credit but is now a pre-requisite</b>                            |
| <b>3</b> | <b>2</b> | <b>MRc1 Building Life-Cycle Impact Reduction [2-5]</b><br>Option 1. Historic Building Reuse. See reference guide, [5]<br>Option 2. Renovation of Abandoned or Blighted Building. See reference guide, [5]<br>Option 3. Building and Material Reuse. Reuse or salvage building materials from off site or on site as a percentage of the surface area, as listed in Table 1. Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project. Points by percentage of completed project surface area reused. 25% [2], 50% [3], 75% [4]<br>Option 4. Whole-Building Life-Cycle Assessment. Conduct a life-cycle assessment of the project's structure and enclosure that demonstrates a minimum of 10% reduction, compared with a baseline building, in at least three of the six impact categories listed below, one of which must be global warming potential. No impact category assessed as part of the life-cycle assessment may increase by more than 5% compared with the baseline building.<br>Global warming potential; depletion of the stratospheric ozone; acidification of land and water sources; eutrophication (nitrogen or phosphate); formation of tropospheric ozone; and depletion of nonrenewable energy resources. [3] | <b>Full Team</b><br>Would require a whole building life-cycle assessment. Potentially costly.                                                                                                                                      |



FIGURE 2-A

| Quality |   | Phase  | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Team / Comments                                                                                                                                                                                                                                                                                                    |
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| Yes     | ? | No     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                    |
| 1       | 1 | Const. | <p><b>MRC2 Environmental Product Declarations [1-2]</b></p> <p>Achieve one or more of the options below, for a maximum of 2 points. One point per Option.</p> <p>Option 1. Environmental Product Declaration (EPD). Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of three disclosure criteria.</p> <p>(1) Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one quarter (1/4) of a product for the purposes of credit calculation.</p> <p>(2) Environmental Product Declarations which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope:</p> <p>Industry-wide (generic) EPD -- Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator are valued as one half (1/2) of a product for purposes of credit calculation.</p> <p>Product-specific Type III EPD -- Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator are valued as one whole product for purposes of credit achievement calculation.</p> <p>(3) USGBC approved program -- Products that comply with other USGBC approved environmental product declaration frameworks.</p> <p>Option 2. Multi-Attribute Optimization.</p> <p>Use products that comply with one of the criteria below for 50%, by cost, of the total value of permanently installed products in the project.</p> <p>(1) Third party certified products that demonstrate impact reduction below industry average in at least three of the following categories are valued at 100% of their cost for credit achievement calculations: global warming potential; depletion of the stratospheric ozone layer; acidification of land and water sources; eutrophication (nitrogen or phosphate); formation of tropospheric ozone; and depletion of nonrenewable energy resources.</p> <p>(2) USGBC approved program -- Products that comply with other USGBC approved environmental product declaration frameworks.</p> <p>Products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost. Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.</p> | <p><b>Specifications, Contractor</b></p> <p>Include requirements for the submission of EPDs in specifications.</p>                                                                                                                                                                                                 |
| 2       |   | Const. | <p><b>MRC3 Sourcing of Raw Materials [1-2]</b></p> <p>Achieve one or more of the options below, for a maximum of 2 points. One point per Option.</p> <p>Option 1. Raw Material Source and Extraction Reporting. Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria. Products sourced from manufacturers with self-declared reports are valued as one half (1/2) of a product for credit achievement. Third-party verified corporate sustainability reports (CSR) which include environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain, are valued as one whole product for credit achievement calculation.</p> <p>Option 2. Leadership Extraction Practices. Use products that meet at least one of the responsible extraction criteria for at least 25%, by cost, of the total value of permanently installed building products in the project: Extended producer responsibility; Bio-based materials; Certified Wood products; Materials reuse; Recycled content; USGBC approved program.</p> <p>For credit achievement calculation, products sourced (extracted, manufactured and purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost. Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>Specifications, Contractor</b></p> <p>Documentation is time intensive and costly. Was previously worth more points. While this may not add much to construction costs, it will require documentation by subcontractors, contractors, and LEED consultant/ architect, as well as specifications language.</p> |

FIGURE 2-A

| Quality |   | Phase     | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Team / Comments                                                                                                                                                                                                                                                                                                                                                                                           |
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| Yes     | ? | No        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                           |
| 1       | 1 | Const.    | <b>MRC4 Material Ingredients [1-2]</b><br>Achieve one or more of the options below, for a maximum of 2 points. One point per Option.<br>Option 1. Material Ingredient Reporting. Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm) Manufacturer Inventory. The manufacturer has published complete content inventory for the product; Health Product Declaration. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard; Cradle to Cradle. The end use product has been certified at the Cradle to Cradle v2 Basic level or Cradle to Cradle v3 Bronze level; USGBC approved program.<br>Option 2. Material Ingredient Optimization. Use products that document their material ingredient optimization for at least 25%, by cost, of the total value of permanently installed products in the project using one of these paths: GreenScreen v1.2 with no Benchmark 1 hazards; Cradle to Cradle Certified; USGBC approved program.<br>Option 3. Product Manufacturer Supply Chain Optimization<br>Use building products for at least 25%, by cost, of the total value of permanently installed products in the project that are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material, and are sourced from product manufacturers with independent third party verification of their supply chain that verifies processes are in place to identify, document and communicate information about safety, health, and hazards of chemicals within the products throughout the supply chain.<br>For credit achievement calculation of options 2 and 3, products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost. For credit achievement calculation, the value of individual products compliant with either option 2 or 3 can be combined to reach the 25% threshold but products compliant with both option 2 and 3 may only be counted once. Structure and enclosure materials may not constitute more than 30% of the value of compliant building products. | <b>Specifications, Contractor</b><br>Option 1 should be attainable. This is a new approach to LEED materials optimization, and the contractor will need to play an active role in sourcing the "20 products from 5 manufacturers" to obtain this point. Specs should identify material categories where documentation is available and require documentation of compliance as part of product submittals. |
| 2       |   | Const.    | <b>MRC5 Construction and Demolition Waste Management [1-2]</b><br>Option 1. Diversion<br>Path 1. Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams. [1]<br>Path 2. Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams. [2]<br>Option 2. Reduction of Total Waste Material<br>Do not generate more than 2.5 pounds of construction waste per square foot of the building's floor area. [2]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Specifications, Contractor</b><br>Specify CDWM requirements. Require strategies for reduction and tracking of total waste material while leaving option for credit compliance open to contractor discretion.<br>Contractor to develop, submit, implement and track CDWM plan.                                                                                                                          |
| 10      | 6 | 0         | Indoor Environmental Quality (EQ) 16 Points Possible                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                           |
| Y       |   | Prereq. 1 | <b>EQp1 Minimum IAQ Performance</b><br>For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), meet the minimum requirements of ASHRAE Standard 62.1-2010, Sections 4-7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent.<br>For naturally ventilated spaces (and for mixed-mode systems when the mechanical ventilation is inactivated), determine the minimum outdoor air opening and space configuration requirements using the natural ventilation procedure from ASHRAE Standard 62.1-2010 or a local equivalent, whichever is more stringent. Confirm that natural ventilation is an effective strategy for the project by following the flow diagram in the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10, March 2005, Natural Ventilation in Nondomestic Buildings, Figure 2.8, and meet the requirements of ASHRAE Standard 62.1-2010, Section 4, or a local equivalent, whichever is more stringent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Mechanical</b><br>Verify and document compliance.                                                                                                                                                                                                                                                                                                                                                      |



FIGURE 2-A

| Quality  | Phase    | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Team / Comments                                                                                                                                                                                                                                                                                                                                                                              |
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| Yes ? No |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Y</b> | Prereq 2 | <b>EQp2 Environmental Tobacco Smoke Control</b><br>Prohibit smoking inside the building.<br>Prohibit smoking outside the building except in designated smoking areas located at least 25 feet from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes.<br>Signage must be posted within 10 feet of all building entrances indicating the no-smoking policy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Owner</b><br>Provide compliant property smoking policy.                                                                                                                                                                                                                                                                                                                                   |
| <b>1</b> | Design   | <b>EQc1 Enhanced Indoor Air Quality Strategies [1-2]</b><br>Achieve one or more of the options below, for a maximum of 2 points. One point per Option.<br>Option 1. Enhanced IAQ Strategies<br>Mechanically ventilated spaces to have entryway systems, interior cross-contamination prevention, and filtration.<br>Naturally ventilated spaces to have entryway systems and natural ventilation design calculations.<br>Mixed-mode systems to have entryway systems, interior cross-contamination prevention, filtration, natural ventilation design calculations, and mixed-mode design calculations<br>Option 2. Additional Enhanced IAQ Strategies<br>Mechanically ventilated spaces (select one): exterior contamination prevention; increased ventilation; carbon dioxide monitoring; or additional source control and monitoring.<br>Naturally ventilated spaces (select one): exterior contamination prevention; additional source control and monitoring; or natural ventilation room-by-room calculations.<br>Mixed-mode systems (select one): exterior contamination prevention; increased ventilation; additional source control and monitoring; or natural ventilation room-by-room calculations. | <b>Mechanical, Architect</b><br>Assess options and strategies to confirm number of points to target.                                                                                                                                                                                                                                                                                         |
| <b>2</b> | Const.   | <b>EQc2 Low-Emitting Materials [1-3]</b><br>Option 1. Product Category Calculations. Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed in credit Table 2.<br>Option 2. Budget Calculation Method. If some products in a category do not meet the criteria, project teams may use the budget calculation method (Table 3).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Architect, Interiors, Contractor</b><br>Select and specify products during design development to meet credit criteria. There are 6 categories: Interior Paints & Coatings, Interior Adhesives and Sealants, Flooring, Composite Wood, Ceilings, walls and acoustic & thermal insulation, and Furniture. Compliance in 2 categories= 1 point; 4 categories= 2 points; 5 categories=3points |
| <b>1</b> | Const.   | <b>EQc3 Construction Indoor Air Quality Management Plan [1]</b><br>Develop and implement an indoor air quality (IAQ) management plan for the construction and pre-occupancy phases of the building.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Specifications, Contractor</b><br>Specify requirement for creation and implementation of compliant construction indoor air quality management plan.                                                                                                                                                                                                                                       |
| <b>2</b> | Const.   | <b>EQc4 Indoor Air Quality Assessment [1-2]</b><br>Option 1. Flush-Out [1]<br>Path 1. Before Occupancy. Install new filtration media and supply a total air volume of 14,000 cubic feet of outdoor air per gross square foot while maintaining temperature and humidity prior to occupancy.<br>Path 2. During Occupancy. Install new filtration media and supply a total air volume of 3,500 cubic feet of outdoor air per gross square foot while maintaining temperature and humidity prior to occupancy. Continue flushout at 0.3 CFM until total of 14,000 cubic feet per square foot have been delivered.<br>Option 2. Air Testing [2]<br>After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing for all occupied spaces.                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Owner, Contractor</b><br>Determine whether air testing between construction and occupancy is desirable for confirmation of air quality and attainment of second LEED point.                                                                                                                                                                                                               |
| <b>1</b> | Design   | <b>EQc5 Thermal Comfort [1]</b><br>Option 1. ASHRAE Standard 55-2010. Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2010, Thermal Comfort Conditions for Human Occupancy with errata or a local equivalent.<br>Option 2. ISO and CEN Standards. Design HVAC systems and the building envelope to meet the requirements of the applicable standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Mechanical</b><br>Confirm design will be able to meet ASHRAE 55-2010.                                                                                                                                                                                                                                                                                                                     |

FIGURE 2-A

| Quality |   | Phase  | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Team / Comments                                                                                                                                                                                                                            |
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| Yes     | ? | No     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                            |
| 1       | 1 | Design | <b>EQc6 Interior Lighting [1-2]</b><br>Select one or both of the following two options.<br>Option 1. Lighting Control. For at least 90% of individual occupant spaces, provide individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel). For all shared multioccupant spaces have in place multizone control systems with at least three lighting levels, lighting for any presentation or projection wall must be separately controlled, switches or manual controls must be located in the same space as the controlled luminaires.<br>Option 2. Lighting Quality. Choose four of the following strategies: low glare fixtures; high CRI; long life light sources; less than 25% direct-only lighting; light/high reflectance interior finishes; light/high reflectance furnishings; proportionate wall/work plane illuminance; proportionate ceiling/work plane illuminance.<br>[Other requirements for Retail.] | <b>Electrical, Owner</b><br>Pursue Option 2 and select the four or more strategies that will be employed on the project. Review whether Option 1 will be achievable on the project.                                                        |
| 3       |   | Design | <b>EQc7 Daylight [1-3]</b><br>Option 1. Simulation. Spatial Daylight Autonomy and Annual Sunlight Exposure. Demonstrate through annual computer simulations that spatial daylight autonomy 300/50% is achieved for 55% [2] or 75% [3] of regularly occupied floor area is achieved. And, demonstrate through annual computer simulations that annual sunlight exposure 1000,250 of no more than 10% is achieved.<br>Option 2. Simulation: Illuminance Calculations. Demonstrate through computer modeling that illuminance levels will be between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox, for 75% [1] or 90% [2] of regularly occupied floor area.<br>Option 3. Measurement. Achieve illuminance levels between 300 lux and 3,000 lux for 75% [2] or 90% [3] of regularly occupied floor area as measured on two dates in year following completion.                                                                                                                                                      | <b>Architect, Interiors</b><br>Indicate whether daylight simulation will be able to show credit achievement and/or whether team should plan on field measurement following completion.                                                     |
| 1       |   | Design | <b>EQc8 Quality Views [1]</b><br>Achieve a direct line of sight to the outdoors via vision glazing, not obstructed by patterns or tints that distort color balance, for 75% of all regularly occupied floor area. Additionally, provide at least two of the following four kinds of views: multiple lines of sight to vision glazing in different directions at least 90 degrees apart; views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing; unobstructed views located within the distance of three times the head height of the vision glazing; and views with a view factor of 3 or greater, as defined in "Windows and Offices: A Study of Office Worker Performance and the Indoor Environment."                                                                                                                                                                                                                                          | <b>Architect, Interiors</b><br>Provide design concept indicating all regularly occupied spaces, concepts for locations of permanent interior obstructions. Provide building sections through all exterior glazing and skylight conditions. |
| 1       |   | Design | <b>EQc9 Acoustic Performance [1]</b><br>For all occupied spaces, meet the requirements for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking.<br>Achieve maximum background noise levels from heating, ventilating, and air conditioning (HVAC) systems per 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1; AHRJ Standard 885-2008, Table 15; or a local equivalent. Calculate or measure sound levels.<br>Meet the composite sound transmission class (STC) ratings listed in credit Table, or local building code, whichever is more stringent.<br>Meet the reverberation time requirements in credit Table.<br>For all large conference rooms and auditoriums seating more than 50 persons, evaluate whether sound reinforcement and AV playback capabilities are needed. For projects that use masking systems, the design levels must not exceed 48 dBA. Ensure that loudspeaker coverage provides uniformity of +/-2 dBA and that speech spectra are effectively masked.             | <b>Architect, Interiors, Mechanical</b><br>Review credit requirements and confirm readiness to meet credit going forward.                                                                                                                  |



FIGURE 2-A

| Quality                                                                                  | Phase | Title, [Available Points]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Team / Comments                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes ?                                                                                    | No    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| 5                                                                                        | 0     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6 Points Possible                                                                                                                                                                                                                                                                              |
| <b>Innovation</b>                                                                        |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>Innovation in Design or Pilot Credit or Exemplary Performance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Full Team</b>                                                                                                                                                                                                                                                                               |
|                                                                                          |       | Possible Exemplary Performance Credits: Protect or Restore Habitat; Rainwater Management; Optimize Energy Performance; Renewable Energy Production; Building Life-Cycle Impact Reduction; Environmental Product Declarations; Sourcing of Raw Materials; BPDO-Material Ingredients; Construction and Demolition Waste Management; Enhanced Air Quality Strategies; Low-Emitting Materials; Quality Views                                                                                                                 | Plan a team meeting during concept or schematic design to discuss the options available for Exemplary Performance, Innovation and Pilot Credits. Select no more than ten for further analysis and consideration to be narrowed to 6 by the end of construction documents and 5 for submission. |
| 1                                                                                        |       | <b>Innovation in Design or Exemplary Performance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                |
|                                                                                          |       | Possible Innovation Credits: Sustainable Purchasing Policy; Green Building Education; Solid Waste Management Policy; Building Exterior and Hardscape Management Plan; Green Cleaning (3 options); IPM, Erosion Control, and Landscape Management Plan                                                                                                                                                                                                                                                                    | Achieve 95% diversion of construction waste.                                                                                                                                                                                                                                                   |
| 1                                                                                        |       | <b>Innovation in Design or Pilot Credit</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                |
|                                                                                          |       | Possible Pilot Credits: Ergonomics Strategy; Bird Collision Deterrence; Clean Construction; Exterior Noise Control; Design for Active Occupants; Environmentally Preferable Interior Finishes and Furnishings; Local Food Production; Verified Construction & Demolition Recycling Rate s; LEED O+M Starter; Green Cleaning Policy and IPM Plan, Purchasing Waste and Renovation Policies, Site Management Policy, and/or Systems O+M Plan; Social Equity Within the Supply Chain; Social Equity Within the Project Team | Potentially provide tenant fitup design guidelines (a core and shell credit)                                                                                                                                                                                                                   |
| 1                                                                                        |       | <b>Innovation in Design or Pilot Credit</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                |
|                                                                                          |       | See above                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                |
|                                                                                          |       | <b>Pilot Credit</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                |
|                                                                                          |       | See above                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>LEED® Accredited Professional</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Architect</b>                                                                                                                                                                                                                                                                               |
|                                                                                          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Achieved, complete form.                                                                                                                                                                                                                                                                       |
| 3                                                                                        | 2     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4 Points Possible                                                                                                                                                                                                                                                                              |
| <b>Regional Priority</b>                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| Earn up to 4 points out of six possible priority points based on achieved credits above. |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>Renewable Energy Production (EAc5)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>Surrounding Density and Diverse Uses (LTc4)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>Bicycle Facilities (LTc6)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>Sourcing of Raw Materials (MRc3)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                |
|                                                                                          | 1     | <b>Protect or Restore Habitat (SSc2)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                |
| 1                                                                                        |       | <b>Rainwater Management (SSc4)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                |
| Yes ?                                                                                    | No    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| 60                                                                                       | 39    | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 100 of 110 Points Possible*                                                                                                                                                                                                                                                                    |
| <b>Project Totals (pre-certification estimates)</b>                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| Certified: 40-49 points, Silver: 50-59 points, Gold: 60-79 points, Platinum: 80+ points  |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |
| * Innovation and Regional Priority are excluded from the base of 100 possible points.    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                |

**Jesse Robbins**

---

**From:** LEED Info <leedinfo@usgbc.org>  
**Sent:** Thursday, December 08, 2016 4:17 PM  
**To:** Jesse Robbins  
**Subject:** Thank you for your LEED Project Registration

**U.S. GREEN BUILDING COUNCIL**

Dear Jesse Robbins,

Your LEED project has been successfully registered in LEED Online.

|                       |                          |
|-----------------------|--------------------------|
| Project ID            | : 1000097092             |
| Project Title         | : Burlington City Center |
| Project Rating System | : LEED v4 BD+C: NC       |
| Registration Type     | : Individual Project     |
| Registration Date     | : 12/08/2016             |
| Project Location      | : Burlington,VT,US,05401 |

You may now log into LEED Online to manage your project and begin the application process. The first time you log in, you will be presented with a set of 'Getting Started' information that will help you kick off the certification process. Further technical LEED assistance is available through the following resources:

- The help section of LEED Online
- LEED Resources & Tools : <https://new.usgbc.org/leed/certification>
- LEED Reference Guides : <https://new.usgbc.org/store/reference-guides>
- Subscribe to LEED Update, a quarterly e-newsletter from USGBC and GBCI : <https://new.usgbc.org/legacy/account/subscriptions>
- LEEDuser, a third-party resource that offers a variety of supplemental LEED advice: <http://www.leeduser.com>

If you find an error within the LEED Online system, including any of the forms, please report it using of the feedback button, located in the menu bar. If you have questions



We thank you for your  
registration and  
pleasing

# LEED ONLINE

 Jesse Robbins



Project Registration

Details

Agreement

Payment

Receipt

Thank you!

Your payment has been received and your receipt has been sent to **jrobbins@ffinc.com**.

Order summary

|         |                        |
|---------|------------------------|
| ORDER # | 0012045856             |
| AMOUNT  | \$ 1,200.00            |
| TITLE   | Burlington City Center |
| ID      | 1000097092             |

PRINT ORDER

DONE

Notes

Upon receipt, please allow 2-3 business days for processing.

A copy of the invoice must be included with payment.

To avoid delays in processing, please write the invoice number on the check.

Projects may NOT submit for review until the check processing for the registration payment is complete.

FIGURE 2-B

FIGURE 4-A

**BRICK-FACED PANEL**

Manufacturer: Saramac

Website: <http://www.saramac.com/en/documents/newfor2009/index.html>

Image:

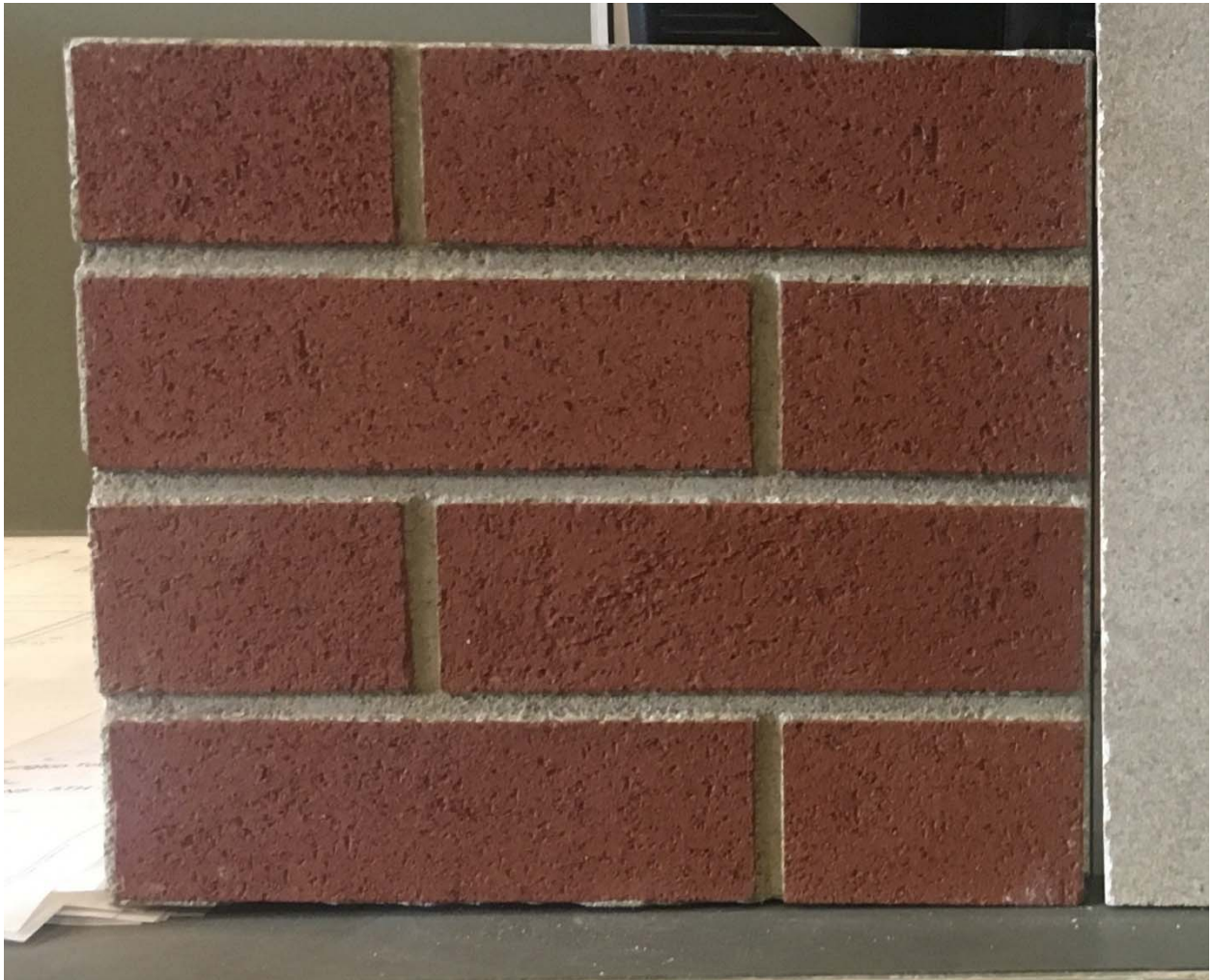




FIGURE 4-B

**LIMESTONE FINISHED PANEL**

Manufacturer: Saramac

Website: <http://www.saramac.com/en/documents/newfor2009/index.html>

Image:



FIGURE 4-C

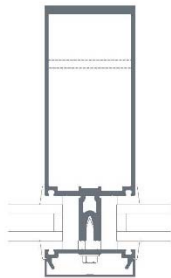
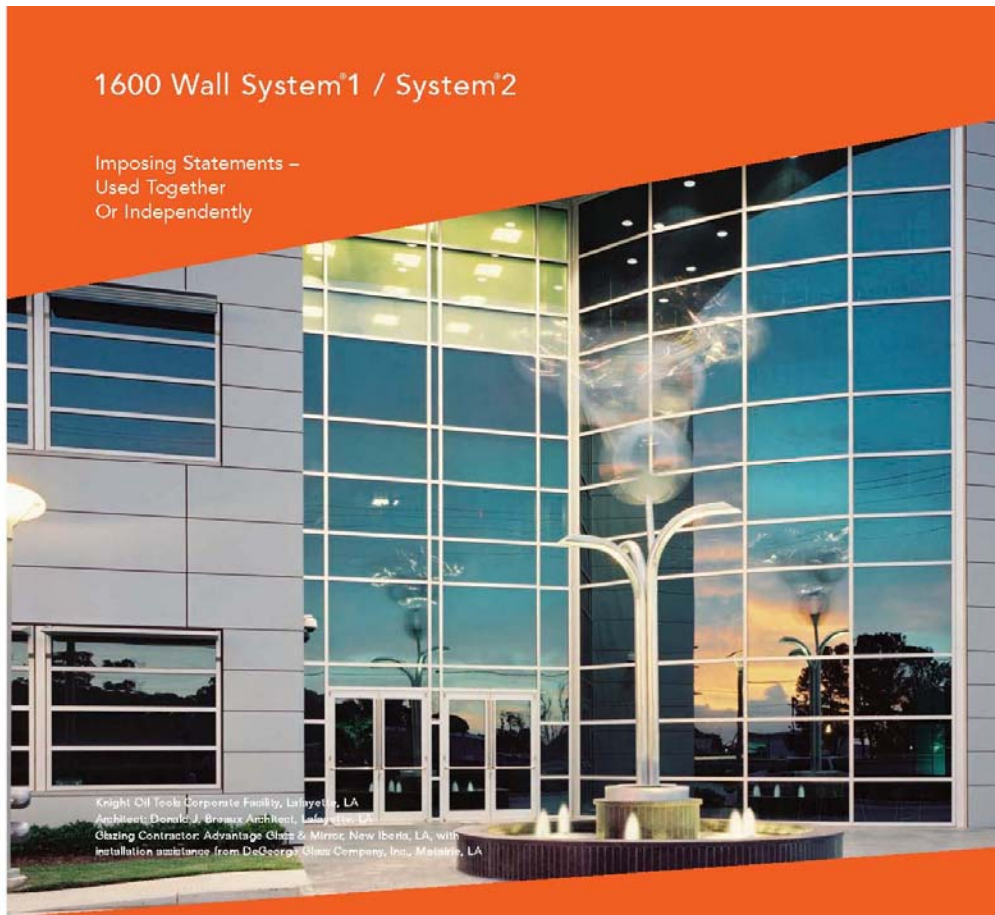
## ALUMINUM STOREFRONT AND ENTRANCE DOORS

Manufacturer: Kawneer 1600

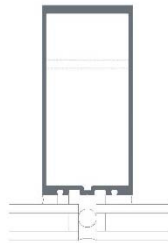
Website:

[http://www.kawneer.com/kawneer/north\\_america/en/product.asp?cat\\_id=1992&prod\\_id=1801&desc=hurricane-resistant-curved-curtain-wall-systems](http://www.kawneer.com/kawneer/north_america/en/product.asp?cat_id=1992&prod_id=1801&desc=hurricane-resistant-curved-curtain-wall-systems)

Image:



1600 Wall System®1



1600 Wall System®2



FIGURE 4-D

**ALUMINUM WINDOWS UPPER FLOORS**

Manufacturer: Kawneer FG 501T

Website: [http://www.kawneer.com/kawneer/north\\_america/en/product.asp?prod\\_id=4495](http://www.kawneer.com/kawneer/north_america/en/product.asp?prod_id=4495)

Image:

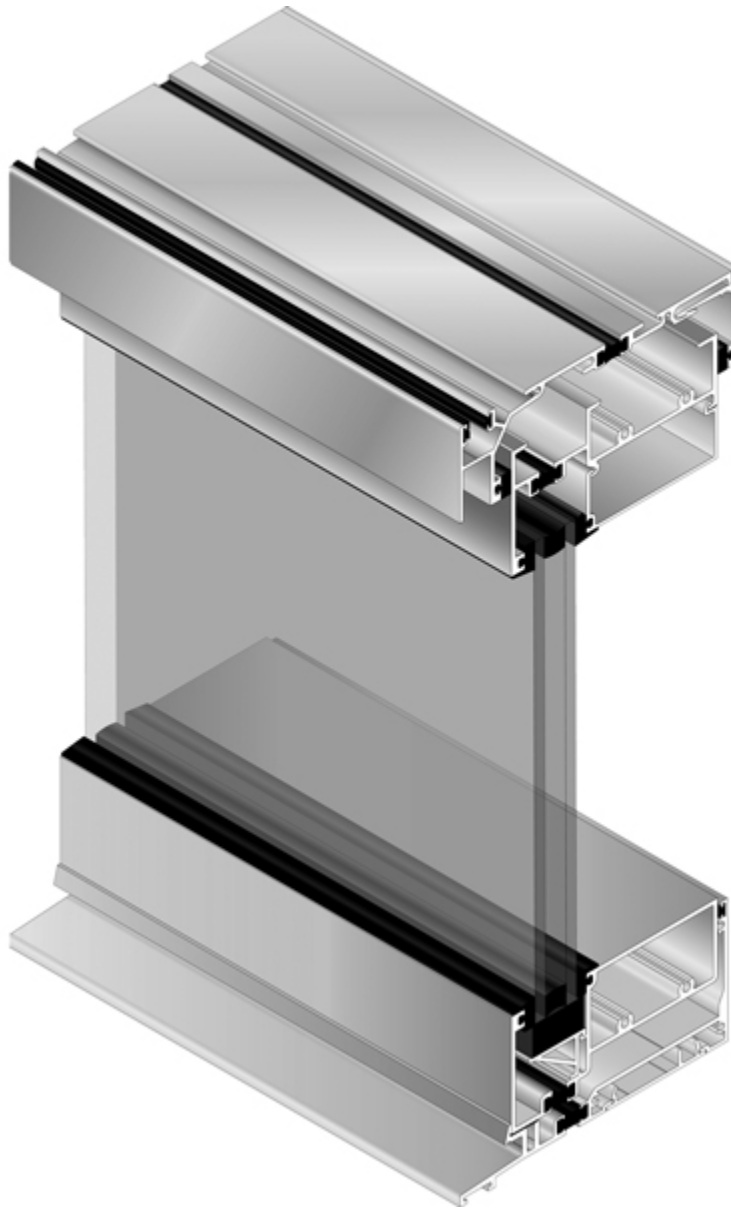


FIGURE 4-E

## ALUMINUM PANELS

Manufacturer: Kawneer to Match Window System

Website: [http://www.kawneer.com/kawneer/north\\_america/en/product.asp?prod\\_id=4495](http://www.kawneer.com/kawneer/north_america/en/product.asp?prod_id=4495)

Image:

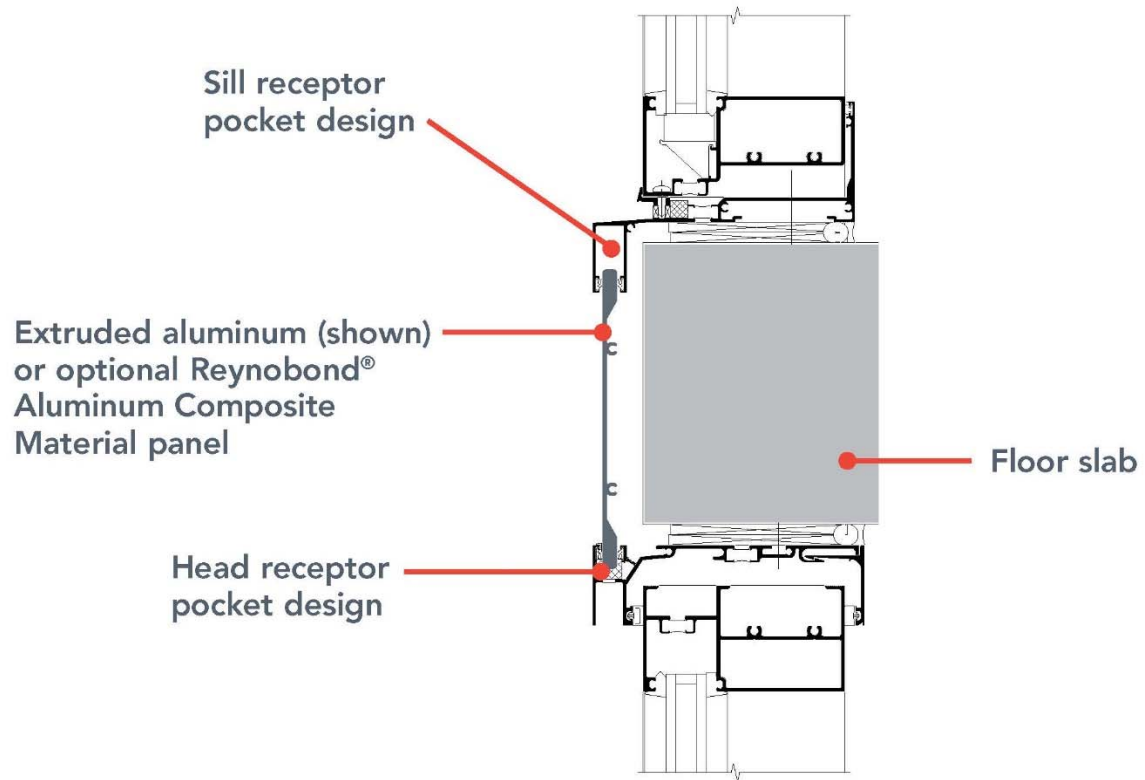




FIGURE 4-F

**PAINTED METAL AND STAINLESS STEEL CABLE RAILING**

Manufacturer: Wagner

Website: <http://www.wagnercompanies.com/products-services/railing-systems-and-components/cable-railing/>

Image:



FIGURE 4-G

**GLASS AND STEEL CANOPY**

Manufacturer: Custom

Image:





FIGURE 4-H

**EXTERIOR WALL-MOUNTED LIGHT FIXTURE**

Manufacturer: Bega 66 698

Website: <http://www.bega-us.com/productdetail.aspx?groupid=126655&itemid=6785&familyid=16>

Image:



## Wall luminaires with single-sided light output

**Housing:** Extruded and die cast aluminum. Mounts directly to a BEGA 19537 box (provided). Die castings are marine grade, copper free ( $\leq 0.3\%$  copper content) A360.0 aluminum alloy.

**Enclosure:** Tempered, clear glass, flush to the die casting to prevent water accumulation. Fully gasketed for weather tight operation using a 'U' channel molded silicone rubber gasket.

**Electrical:** 18W LED luminaire, 20.5 total system watts,  $-40^{\circ}\text{C}$  start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. LED module(s) are available from factory for easy replacement. Standard LED color temperature is 3000K with an 85 CRI. Available in 4000K (85 CRI); add suffix K4 to order.

**Notes:** LEDs supplied with luminaire. Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to [www.bega-us.com](http://www.bega-us.com).

**Finish:** All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. Available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

**CSA** certified to U.S. and Canadian standards for wet locations. Protection class IP65

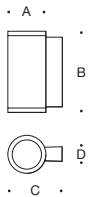
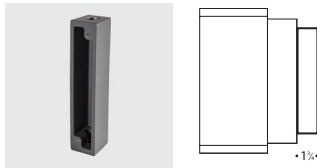
**Weight:** 7.3 lbs

**Luminaire Lumens:** 803

Tested in accordance with LM-79-08

### Mounting options:

**79547** Surface-mount wiring box



These luminaires mount over a custom BEGA recessed box. This box can be shipped ahead of the luminaire.

**Narrow beam upwards or downwards**



|                | Lamp    | $\beta$        | A              | B               | C              | D              | Wiring box*  |
|----------------|---------|----------------|----------------|-----------------|----------------|----------------|--------------|
| <b>66 698*</b> | 18W LED | $19.5^{\circ}$ | $5\frac{5}{8}$ | $11\frac{3}{4}$ | $7\frac{7}{8}$ | $1\frac{5}{8}$ | <b>19537</b> |

$\beta$  = Beam angle \*Small opening wiring box included.

Type:  
BEGA Product:  
Project:  
Voltage:  
Color:  
Options:  
Modified:

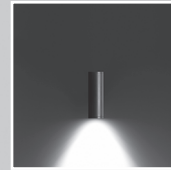




FIGURE 4-I

**EXTERIOR CANOPY-MOUNTED LIGHT FIXTURE**

Manufacturer: Bega 77 529

Website: <http://www.bega-us.com/productdetail.aspx?groupid=179a&itemid=5156&familyid=20>

Image:

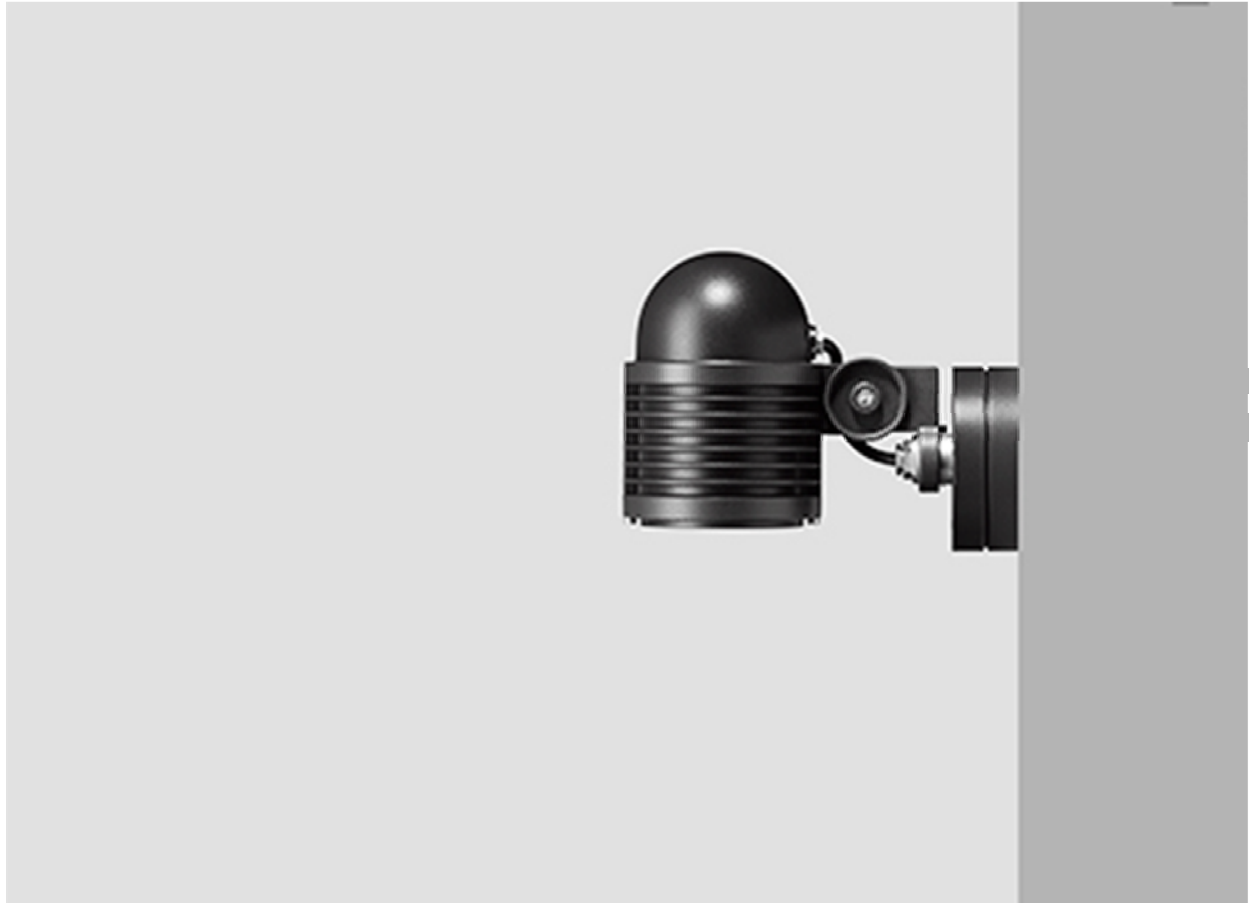


FIGURE 4-J

**PRE-CAST CONCRETE ROOF PAVERS AND PEDESTAL SYSTEM**

Manufacturer: Hanover

Website: <http://www.hanoverpavers.com/index.php/pedestal-pavers>

Image:





FIGURE 4-K

## POROUS PAVEMENT

Manufacturer: Flexi-Pave

Website: <http://kbius.com/kbi-products/kbi-flexi-pave/>

Image:



## FIGURE 4-L

### **FLUID-APPLIED MEMBRANE ROOFING**

Manufacturer: Kemper 2K-PUR

Website: <http://www.kemper-system.com/CA/eng/products/kemperol-2k-pur/>

Image:



FIGURE 4-M

## GREEN ROOFING SYSTEM

Manufacturer: Kemper 2K-PUR Green Roof

Website: <http://www.kemper-system.com/US/eng/applications/green-roofs/>

Image:

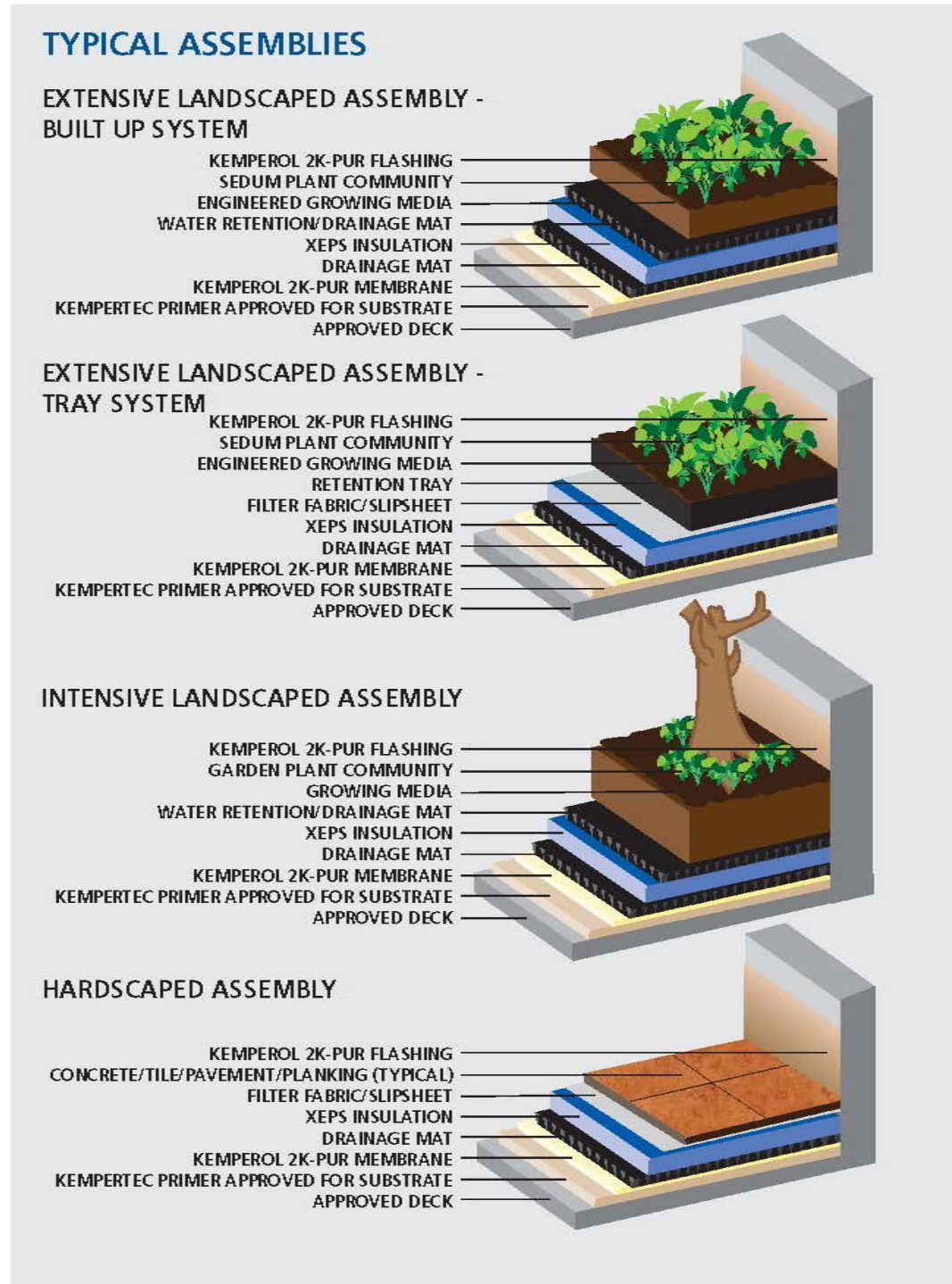


FIGURE 4-N

## SOLAR PANELS

Manufacturer: Solar City

Website: <http://www.solarcity.com/>

Image:





FIGURE 4-O

**EXTERIOR POLE-MOUNTED LIGHT FIXTURE A**

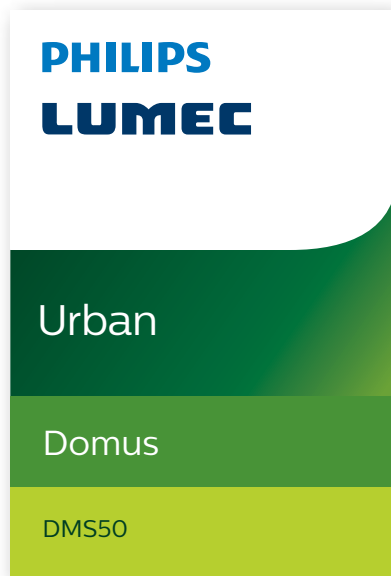
Manufacturer: Lumec – Domus DMS50

Website: [http://www.lumec.com/products/luminaires/serie\\_domus.html?A](http://www.lumec.com/products/luminaires/serie_domus.html?A)

Image:



FIGURE 4-O



Project: \_\_\_\_\_

Location: \_\_\_\_\_

Cat.No: \_\_\_\_\_

Type: \_\_\_\_\_

Lamps: \_\_\_\_\_ Qty: \_\_\_\_\_

Notes: \_\_\_\_\_

The Domus 50 is one of the most versatile luminaires offered by Philips Lumec. This classic shape was one of the first in a line of pioneering Philips Lumec designs. Domus offers a subtly refined design that balances shape, dimension and proportion.

### Ordering guide: Luminaire

Example: DMS50-90W80LED4K-T-ACDR-LE3F-120-DMG-SMB-RCD-PH8-BKTX

| Series                | LED module                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                               | Lamp type | Globe material            | Optical system                                                                                                                                                                                                                                                                                                                                                                                                                                | Voltage                                                                                                        | Driver options                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DMS50</b>          |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                               | <b>T</b>  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>DMS50</b><br>Domus | <b>4000K</b>                                                                                                                                                                                                                                                  | <b>3000K</b>                                                                                                                                                                                                                                                  | <b>T</b>  | <b>ACDR</b> Acrylic globe | <b>Globe</b><br><b>LE2A</b> <sup>6</sup> Type II (ASYM) with globe<br><b>LE3A</b> <sup>6</sup> Type III (ASYM) with globe<br><b>LE4A</b> <sup>6</sup> Type IV (ASYM) with globe                                                                                                                                                                                                                                                               | <b>120</b> 120V<br><b>208</b> 208V<br><b>240</b> 240V<br><b>277</b> 277V<br><b>347</b> 347V<br><b>480</b> 480V | <b>AST</b> <sup>3</sup> Pre-set, progressive start-up<br><b>CLO</b> <sup>3</sup> Pre-set, manage lumen depreciation<br><b>DALI</b> <sup>3</sup> Pre-set, compatible with the DALI control system<br><b>OTL</b> <sup>3</sup> Pre-set to signal end of life of the lamp<br><b>DMG</b> 0-10V<br><b>CDMGP</b> <sup>3</sup> Dimming level set by user                                                                                                                                 |
|                       | <b>35W32LED4K</b><br><b>55W32LED4K</b><br><b>55W48LED4K</b><br><b>70W64LED4K</b><br><b>72W32LED4K</b><br><b>80W48LED4K</b><br><b>90W80LED4K</b><br><b>108W48LED4K</b><br><b>110W64LED4K</b><br><b>135W80LED4K</b><br><b>145W64LED4K</b><br><b>180W80LED4K</b> | <b>35W32LED3K</b><br><b>55W32LED3K</b><br><b>55W48LED3K</b><br><b>70W64LED3K</b><br><b>72W32LED3K</b><br><b>80W48LED3K</b><br><b>90W80LED3K</b><br><b>108W48LED3K</b><br><b>110W64LED3K</b><br><b>135W80LED3K</b><br><b>145W64LED3K</b><br><b>180W80LED3K</b> |           |                           | <b>Sag lens</b><br><b>LE2S</b> Type II (ASYM) Sag glass lens<br><b>LE3S</b> Type III (ASYM) Sag glass lens<br><b>LE4S</b> Type IV (ASYM) Sag glass lens<br><b>LE5S</b> <sup>1</sup> Type V (SYMM) Sag glass lens<br><br><b>Flat lens</b><br><b>LE2F</b> Type II (ASYM) Flat glass lens<br><b>LE3F</b> Type III (ASYM) Flat glass lens<br><b>LE4F</b> Type IV (ASYM) Flat glass lens<br><b>LE5F</b> <sup>1</sup> Type V (SYMM) Flat glass lens |                                                                                                                | <b>CDMGE25</b> <sup>3</sup> 8 hrs. 25% reduction<br><b>CDMGE50</b> <sup>3</sup> 8 hrs. 50% reduction<br><b>CDMGE75</b> <sup>3</sup> 8 hrs. 75% reduction<br><b>CDMGM25</b> <sup>3</sup> 6 hrs. 25% reduction<br><b>CDMGM50</b> <sup>3</sup> 6 hrs. 50% reduction<br><b>CDMGM75</b> <sup>3</sup> 6 hrs. 75% reduction<br><b>CDMGS25</b> <sup>3</sup> 4 hrs. 25% reduction<br><b>CDMGS50</b> <sup>3</sup> 4 hrs. 50% reduction<br><b>CDMGS75</b> <sup>3</sup> 4 hrs. 75% reduction |

### Ordering guide (continued)

| Adaptors                                                                                                                                                                                                                                                                                                   | Luminaire options                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Poles & Brackets                                                                                 | Finish                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MA1</b> 11/4" NPT threaded hole adaptor<br><b>MA2</b> 11/2" NPT threaded hole adaptor<br><b>SMA</b> <sup>7</sup> Decorative retro side-mounted cast-aluminum, accepts tubes from 1 5/8" to 2 3/8"<br><b>SMB</b> Decorative contemporary side-mounted cast-aluminum, accepts tubes from 1 5/8" to 2 3/8" | <b>BO</b> Bridge and Overpass<br><b>DE1</b> Decorative deflector<br><b>HS</b> House side shield<br><b>PH7</b> Photoelectric cell, bottom type<br><b>PH8</b> <sup>2,4</sup> Photoelectric cell, extended life<br><b>PH9</b> <sup>2,4</sup> Shorting cap<br><b>PHXL</b> <sup>2,4</sup> Photoelectric cell, extended life<br><b>RC</b> <sup>2,5</sup> Receptacle 3 pins<br><b>RCD</b> <sup>2,5</sup> Receptacle 5 pins<br><b>RCD7</b> <sup>2,5</sup> Receptacle 7 pins<br><b>SP2</b> Surge protector |  | Consult Philips.com/ luminaires for details and the complete line of Philips poles and brackets. | <b>BE2TX</b> Textured midnight blue<br><b>BE6TX</b> Textured ocean blue<br><b>BE8TX</b> Textured royal blue<br><b>BG2TX</b> Textured Sandstone<br><b>BKTX</b> Textured black<br><b>BRTX</b> Textured bronze<br><b>GN4TX</b> Textured blue green<br><b>GN6TX</b> Textured forest green<br><b>GN8TX</b> Textured Dk forest green<br><b>GNTX</b> Textured green<br><b>GR</b> Gray sandtex<br><b>GY3TX</b> Textured medium grey<br><b>NP</b> Natural aluminum<br><b>RD2TX</b> Textured burgundy<br><b>RD4TX</b> Textured scarlet<br><b>TG</b> Hammettone gold<br><b>WHTX</b> Textured white |

### Footnotes

- Not available with **HS** option.
- SMA** or **SMB** adaptors is required for this option.
- Not available 347-480 volt.
- Luminaire option **RC**, **RCD** or **RCD7** is required with this options.
- Use of photoelectric cell or shorting cap is required to ensure proper illumination.
- Globe Material **ACDR** is required with this optical system.
- Only 3 pin receptacle **RC** is available with **SMA** adaptor.





FIGURE 4-O

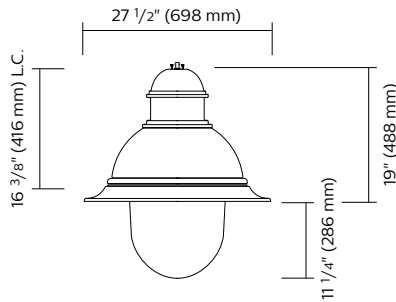
# DMS50 Domus LED pendant

## Urban luminaire

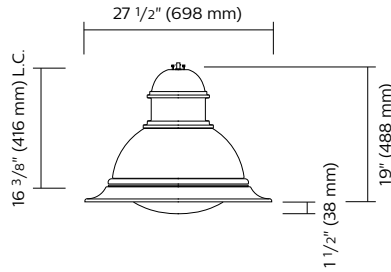
### Dimensions

EPA: 1.35 ft² max.

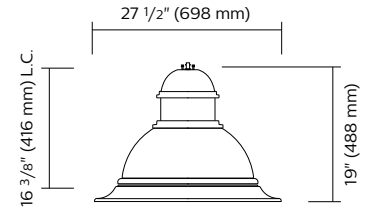
Weight: 42 lbs (19.1kg) max.



**DMS50 - A optics**  
Long drop globe



**DMS50 - S optics**  
Sag lens



**DMS50 - F optics**  
Flat lens

### Predicted Lumen Depreciation Data

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L<sub>70</sub> is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L<sub>70</sub> hours limited to 6 times actual LED test hours.

| Ambient Temperature °C | Driver mA | Calculated L <sub>70</sub> Hours | L <sub>70</sub> per TM-21 | Lumen Maintenance % at 60,000 hrs |
|------------------------|-----------|----------------------------------|---------------------------|-----------------------------------|
| 35°C                   | 700 mA    | >100,000 hours                   | >60,000 hours             | >86%                              |

### LED Wattage and Lumen Values: 4000K Domus luminaire

| Flat lens           |            |                  |                                   |             | Type LE2F                     |                |            | Type LE3F                     |                |            | Type LE4F                     |                |            | Type LE5F                     |                |            |
|---------------------|------------|------------------|-----------------------------------|-------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|
| Ordering Code       | Total LEDs | LED Current (mA) | Average System Watts <sup>1</sup> | Color Temp. | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating |
| DMS50-35W32LED4K-T  | 32         | 350              | 37                                | 4000K       | 4,039                         | 109            | B1-U0-G1   | 3,934                         | 106            | B1-U0-G1   | 3,895                         | 105            | B1-U0-G1   | 3,925                         | 106            | B3-U0-G1   |
| DMS50-55W32LED4K-T  | 32         | 530              | 55                                | 4000K       | 5,808                         | 106            | B1-U0-G1   | 5,657                         | 103            | B1-U0-G1   | 5,602                         | 102            | B1-U0-G2   | 5,644                         | 103            | B3-U0-G1   |
| DMS50-72W32LED4K-T  | 32         | 700              | 73                                | 4000K       | 7,312                         | 101            | B2-U0-G1   | 7,122                         | 98             | B1-U0-G2   | 7,052                         | 97             | B1-U0-G2   | 7,105                         | 98             | B3-U0-G2   |
| DMS50-55W48LED4K-T  | 48         | 350              | 54                                | 4000K       | 6,041                         | 113            | B1-U0-G1   | 5,883                         | 110            | B1-U0-G1   | 5,826                         | 109            | B1-U0-G2   | 5,870                         | 110            | B3-U0-G1   |
| DMS50-80W48LED4K-T  | 48         | 530              | 80                                | 4000K       | 8,641                         | 108            | B2-U0-G2   | 8,417                         | 105            | B2-U0-G2   | 8,335                         | 104            | B2-U0-G2   | 8,398                         | 105            | B3-U0-G2   |
| DMS50-108W48LED4K-T | 48         | 700              | 106                               | 4000K       | 10,852                        | 103            | B2-U0-G2   | 10,570                        | 100            | B2-U0-G2   | 10,467                        | 99             | B2-U0-G2   | 10,546                        | 100            | B4-U0-G2   |
| DMS50-70W64LED4K-T  | 64         | 350              | 69                                | 4000K       | 7,856                         | 113            | B2-U0-G1   | 7,709                         | 111            | B1-U0-G2   | 7,697                         | 111            | B1-U0-G2   | 7,643                         | 110            | B3-U0-G2   |
| DMS50-110W64LED4K-T | 64         | 530              | 105                               | 4000K       | 11,261                        | 107            | B2-U0-G2   | 11,050                        | 105            | B2-U0-G2   | 11,034                        | 105            | B2-U0-G2   | 10,955                        | 104            | B4-U0-G2   |
| DMS50-145W64LED4K-T | 64         | 700              | 141                               | 4000K       | 14,148                        | 101            | B3-U0-G2   | 13,883                        | 99             | B2-U0-G2   | 13,862                        | 99             | B2-U0-G2   | 13,763                        | 98             | B4-U0-G2   |
| DMS50-90W80LED4K-T  | 80         | 350              | 86                                | 4000K       | 9,806                         | 114            | B2-U0-G2   | 9,623                         | 112            | B2-U0-G2   | 9,608                         | 112            | B2-U0-G2   | 9,540                         | 111            | B4-U0-G2   |
| DMS50-135W80LED4K-T | 80         | 530              | 131                               | 4000K       | 14,008                        | 107            | B3-U0-G2   | 13,745                        | 105            | B2-U0-G2   | 13,724                        | 105            | B2-U0-G2   | 13,626                        | 104            | B4-U0-G2   |
| DMS50-180W80LED4K-T | 80         | 700              | 174                               | 4000K       | 17,483                        | 100            | B3-U0-G2   | 17,144                        | 98             | B3-U0-G2   | 17,269                        | 99             | B3-U0-G3   | 17,115                        | 98             | B4-U0-G2   |

1. System input wattage may vary based on input voltage, by up to +/- 10%, and based on manufacturer forward voltage, by up to +/- 8%.

2. Lumen values based on photometric tests performed in compliance with IESNA LM-79.

**Note:** Some data may be scaled based on tests of similar, but not identical, luminaires.

FIGURE 4-O

# DMS50 Domus LED pendant

## Urban luminaire

### LED Wattage and Lumen Values: 4000K Domus luminaire (continued)

#### Sag lens

| Ordering Code       | Total LEDs | LED Current (mA) | Average System Watts <sup>1</sup> | Color Temp. | Type LE2S                     |                |            | Type LE3S                     |                |            | Type LE4S                     |                |            | Type LE5S                     |                |            |
|---------------------|------------|------------------|-----------------------------------|-------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|
|                     |            |                  |                                   |             | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating |
| DMS50-35W32LED4K-T  | 32         | 350              | 37                                | 4000K       | 4,064                         | 110            | B1-U0-G1   | 4,005                         | 108            | B1-U0-G1   | 4,005                         | 107            | B1-U0-G1   | 4,005                         | 110            | B1-U0-G1   |
| DMS50-55W32LED4K-T  | 32         | 530              | 55                                | 4000K       | 5,846                         | 106            | B1-U0-G1   | 5,759                         | 105            | B1-U0-G1   | 5,759                         | 104            | B1-U0-G1   | 5,759                         | 106            | B1-U0-G1   |
| DMS50-72W32LED4K-T  | 32         | 700              | 73                                | 4000K       | 7,359                         | 101            | B2-U0-G1   | 7,250                         | 100            | B2-U0-G1   | 7,250                         | 99             | B2-U0-G1   | 7,250                         | 101            | B2-U0-G1   |
| DMS50-55W48LED4K-T  | 48         | 350              | 54                                | 4000K       | 6,079                         | 113            | B1-U0-G1   | 5,990                         | 112            | B1-U0-G1   | 5,990                         | 111            | B1-U0-G1   | 5,990                         | 114            | B1-U0-G1   |
| DMS50-80W48LED4K-T  | 48         | 530              | 80                                | 4000K       | 8,697                         | 109            | B2-U0-G2   | 8,569                         | 107            | B2-U0-G2   | 8,569                         | 106            | B2-U0-G2   | 8,569                         | 109            | B2-U0-G2   |
| DMS50-108W48LED4K-T | 48         | 700              | 106                               | 4000K       | 10,922                        | 103            | B2-U0-G2   | 10,761                        | 102            | B2-U0-G2   | 10,761                        | 101            | B2-U0-G2   | 10,761                        | 103            | B2-U0-G2   |
| DMS50-70W64LED4K-T  | 64         | 350              | 69                                | 4000K       | 7,910                         | 114            | B2-U0-G2   | 7,849                         | 113            | B2-U0-G2   | 7,849                         | 113            | B2-U0-G2   | 7,849                         | 114            | B2-U0-G2   |
| DMS50-110W64LED4K-T | 64         | 530              | 105                               | 4000K       | 11,338                        | 108            | B2-U0-G2   | 11,250                        | 107            | B2-U0-G2   | 11,250                        | 107            | B2-U0-G2   | 11,250                        | 108            | B2-U0-G2   |
| DMS50-145W64LED4K-T | 64         | 700              | 141                               | 4000K       | 14,244                        | 101            | B3-U0-G2   | 14,134                        | 101            | B3-U0-G2   | 14,134                        | 100            | B3-U0-G2   | 14,134                        | 102            | B3-U0-G2   |
| DMS50-90W80LED4K-T  | 80         | 350              | 86                                | 4000K       | 9,873                         | 115            | B2-U0-G2   | 9,797                         | 114            | B2-U0-G2   | 9,797                         | 114            | B2-U0-G2   | 9,797                         | 115            | B2-U0-G2   |
| DMS50-135W80LED4K-T | 80         | 530              | 131                               | 4000K       | 14,102                        | 108            | B3-U0-G2   | 13,993                        | 107            | B3-U0-G2   | 13,993                        | 107            | B3-U0-G2   | 13,993                        | 108            | B3-U0-G2   |
| DMS50-180W80LED4K-T | 80         | 700              | 174                               | 4000K       | 17,668                        | 101            | B3-U0-G2   | 17,526                        | 101            | B3-U0-G2   | 17,526                        | 100            | B3-U0-G2   | 17,526                        | 102            | B3-U0-G2   |

#### Globe (ACDR)

| Ordering Code       | Total LEDs | LED Current (mA) | Average System Watts <sup>1</sup> | Color Temp. | Type LE2A                     |                |            | Type LE3A                     |                |            | Type LE4A                     |                |            |
|---------------------|------------|------------------|-----------------------------------|-------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|
|                     |            |                  |                                   |             | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating |
| DMS50-35W32LED4K-T  | 32         | 350              | 37                                | 4000K       | 4,138                         | 112            | B1-U3-G1   | 4,138                         | 110            | B1-U2-G1   | 4,063                         | 110            | B1-U2-G2   |
| DMS50-55W32LED4K-T  | 32         | 530              | 55                                | 4000K       | 5,952                         | 108            | B1-U3-G1   | 5,952                         | 107            | B1-U3-G2   | 5,844                         | 106            | B1-U3-G2   |
| DMS50-72W32LED4K-T  | 32         | 700              | 73                                | 4000K       | 7,493                         | 103            | B2-U3-G2   | 7,493                         | 102            | B1-U3-G2   | 7,357                         | 101            | B1-U3-G2   |
| DMS50-55W48LED4K-T  | 48         | 350              | 54                                | 4000K       | 6,190                         | 115            | B1-U3-G1   | 6,190                         | 114            | B1-U3-G2   | 6,078                         | 113            | B1-U3-G2   |
| DMS50-80W48LED4K-T  | 48         | 530              | 80                                | 4000K       | 8,855                         | 111            | B2-U3-G2   | 8,855                         | 109            | B2-U3-G2   | 8,695                         | 109            | B1-U3-G3   |
| DMS50-108W48LED4K-T | 48         | 700              | 106                               | 4000K       | 11,120                        | 105            | B2-U3-G2   | 11,120                        | 104            | B2-U3-G2   | 10,919                        | 103            | B2-U3-G3   |
| DMS50-70W64LED4K-T  | 64         | 350              | 69                                | 4000K       | 7,933                         | 114            | B2-U3-G2   | 7,933                         | 112            | B2-U3-G2   | 7,844                         | 113            | B2-U3-G2   |
| DMS50-110W64LED4K-T | 64         | 530              | 105                               | 4000K       | 11,371                        | 108            | B2-U3-G2   | 11,371                        | 106            | B2-U3-G2   | 11,243                        | 107            | B2-U3-G3   |
| DMS50-145W64LED4K-T | 64         | 700              | 141                               | 4000K       | 14,286                        | 102            | B3-U3-G3   | 14,286                        | 100            | B3-U3-G3   | 14,125                        | 101            | B2-U3-G3   |
| DMS50-90W80LED4K-T  | 80         | 350              | 86                                | 4000K       | 9,902                         | 115            | B2-U3-G2   | 9,902                         | 113            | B2-U3-G2   | 9,791                         | 114            | B2-U3-G3   |
| DMS50-135W80LED4K-T | 80         | 530              | 131                               | 4000K       | 14,144                        | 108            | B3-U3-G3   | 14,144                        | 106            | B3-U3-G3   | 13,985                        | 107            | B2-U3-G3   |
| DMS50-180W80LED4K-T | 80         | 700              | 174                               | 4000K       | 17,715                        | 102            | B3-U3-G3   | 17,715                        | 100            | B3-U3-G3   | 17,515                        | 101            | B3-U3-G3   |

1. System input wattage may vary based on input voltage, by up to +/- 10%, and based on manufacturer forward voltage, by up to +/- 8%.

2. Lumen values based on photometric tests performed in compliance with IESNA LM-79.

**Note:** Some data may be scaled based on tests of similar, but not identical, luminaires.



FIGURE 4-O

# DMS50 Domus LED pendant

## Urban luminaire

### LED Wattage and Lumen Values: 3000K Domus luminaire

| Flat lens           |            |                  |                                   |             | Type LE2F                     |                |            | Type LE3F                     |                |            | Type LE4F                     |                |            | Type LE5F                     |                |            |
|---------------------|------------|------------------|-----------------------------------|-------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|
| Ordering Code       | Total LEDs | LED Current (mA) | Average System Watts <sup>1</sup> | Color Temp. | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating |
| DMS50-35W32LED3K-T  | 32         | 350              | 37                                | 3000K       | 3,641                         | 98             | B1-U0-G1   | 3,547                         | 96             | B1-U0-G1   | 3,512                         | 95             | B1-U0-G1   | 3,538                         | 95             | B2-U0-G1   |
| DMS50-55W32LED3K-T  | 32         | 530              | 55                                | 3000K       | 5,237                         | 95             | B1-U0-G1   | 5,101                         | 93             | B1-U0-G1   | 5,051                         | 92             | B1-U0-G1   | 5,089                         | 93             | B3-U0-G1   |
| DMS50-72W32LED3K-T  | 32         | 700              | 73                                | 3000K       | 6,592                         | 91             | B2-U0-G1   | 6,421                         | 88             | B1-U0-G1   | 6,358                         | 87             | B1-U0-G2   | 6,406                         | 88             | B3-U0-G1   |
| DMS50-55W48LED3K-T  | 48         | 350              | 54                                | 3000K       | 5,446                         | 102            | B1-U0-G1   | 5,305                         | 99             | B1-U0-G1   | 5,253                         | 98             | B1-U0-G2   | 5,292                         | 99             | B3-U0-G1   |
| DMS50-80W48LED3K-T  | 48         | 530              | 80                                | 3000K       | 7,791                         | 97             | B2-U0-G1   | 7,589                         | 95             | B1-U0-G2   | 7,515                         | 94             | B1-U0-G2   | 7,571                         | 95             | B3-U0-G2   |
| DMS50-108W48LED3K-T | 48         | 700              | 106                               | 3000K       | 9,784                         | 93             | B2-U0-G2   | 9,530                         | 90             | B2-U0-G2   | 9,437                         | 89             | B2-U0-G2   | 9,508                         | 90             | B4-U0-G2   |
| DMS50-70W64LED3K-T  | 64         | 350              | 69                                | 3000K       | 7,083                         | 102            | B2-U0-G1   | 6,951                         | 100            | B1-U0-G2   | 6,940                         | 100            | B1-U0-G2   | 6,891                         | 99             | B3-U0-G2   |
| DMS50-110W64LED3K-T | 64         | 530              | 105                               | 3000K       | 10,153                        | 96             | B2-U0-G2   | 9,963                         | 95             | B2-U0-G2   | 9,948                         | 94             | B2-U0-G2   | 9,877                         | 94             | B4-U0-G2   |
| DMS50-145W64LED3K-T | 64         | 700              | 141                               | 3000K       | 12,756                        | 91             | B3-U0-G2   | 12,517                        | 89             | B2-U0-G2   | 12,498                        | 89             | B2-U0-G2   | 12,409                        | 88             | B4-U0-G2   |
| DMS50-90W80LED3K-T  | 80         | 350              | 86                                | 3000K       | 8,842                         | 103            | B2-U0-G2   | 8,676                         | 101            | B2-U0-G2   | 8,663                         | 101            | B2-U0-G2   | 8,601                         | 100            | B3-U0-G2   |
| DMS50-135W80LED3K-T | 80         | 530              | 131                               | 3000K       | 12,629                        | 97             | B3-U0-G2   | 12,392                        | 95             | B2-U0-G2   | 12,374                        | 95             | B2-U0-G2   | 12,286                        | 94             | B4-U0-G2   |
| DMS50-180W80LED3K-T | 80         | 700              | 174                               | 3000K       | 15,817                        | 91             | B3-U0-G2   | 15,521                        | 89             | B2-U0-G2   | 15,497                        | 89             | B2-U0-G3   | 15,387                        | 88             | B4-U0-G2   |

| Sag lens            |            |                  |                                   |             | Type LE2S                     |                |            | Type LE3S                     |                |            | Type LE4S                     |                |            | Type LE5S                     |                |            |
|---------------------|------------|------------------|-----------------------------------|-------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|
| Ordering Code       | Total LEDs | LED Current (mA) | Average System Watts <sup>1</sup> | Color Temp. | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating |
| DMS50-35W32LED3K-T  | 32         | 350              | 37                                | 3000K       | 3,665                         | 99             | B1-U0-G1   | 3,611                         | 97             | B1-U0-G1   | 3,576                         | 96             | B1-U0-G1   | 3,668                         | 99             | B3-U0-G1   |
| DMS50-55W32LED3K-T  | 32         | 530              | 55                                | 3000K       | 5,270                         | 96             | B1-U0-G1   | 5,193                         | 94             | B1-U0-G1   | 5,144                         | 94             | B1-U0-G2   | 5,276                         | 96             | B3-U0-G1   |
| DMS50-72W32LED3K-T  | 32         | 700              | 73                                | 3000K       | 6,635                         | 91             | B2-U0-G1   | 6,537                         | 90             | B1-U0-G2   | 6,475                         | 89             | B1-U0-G2   | 6,641                         | 91             | B3-U0-G2   |
| DMS50-55W48LED3K-T  | 48         | 350              | 54                                | 3000K       | 5,481                         | 102            | B1-U0-G1   | 5,401                         | 101            | B1-U0-G1   | 5,349                         | 100            | B1-U0-G2   | 5,487                         | 102            | B3-U0-G1   |
| DMS50-80W48LED3K-T  | 48         | 530              | 80                                | 3000K       | 7,842                         | 98             | B2-U0-G2   | 7,726                         | 97             | B1-U0-G2   | 7,653                         | 96             | B1-U0-G2   | 7,849                         | 98             | B3-U0-G2   |
| DMS50-108W48LED3K-T | 48         | 700              | 106                               | 3000K       | 9,847                         | 93             | B2-U0-G2   | 9,702                         | 92             | B2-U0-G2   | 9,610                         | 91             | B2-U0-G2   | 9,857                         | 93             | B4-U0-G2   |
| DMS50-70W64LED3K-T  | 64         | 350              | 69                                | 3000K       | 7,131                         | 103            | B2-U0-G1   | 7,076                         | 102            | B1-U0-G2   | 7,067                         | 102            | B1-U0-G2   | 7,144                         | 103            | B3-U0-G2   |
| DMS50-110W64LED3K-T | 64         | 530              | 105                               | 3000K       | 10,222                        | 97             | B2-U0-G2   | 10,143                        | 96             | B2-U0-G2   | 10,130                        | 96             | B2-U0-G2   | 10,239                        | 97             | B4-U0-G2   |
| DMS50-145W64LED3K-T | 64         | 700              | 141                               | 3000K       | 12,842                        | 91             | B2-U0-G2   | 12,743                        | 91             | B2-U0-G2   | 12,727                        | 91             | B2-U0-G2   | 12,864                        | 92             | B4-U0-G2   |
| DMS50-90W80LED3K-T  | 80         | 350              | 86                                | 3000K       | 8,901                         | 104            | B2-U0-G2   | 8,833                         | 103            | B2-U0-G2   | 8,822                         | 103            | B2-U0-G2   | 8,917                         | 104            | B4-U0-G2   |
| DMS50-135W80LED3K-T | 80         | 530              | 131                               | 3000K       | 12,715                        | 97             | B2-U0-G2   | 12,616                        | 97             | B2-U0-G2   | 12,601                        | 96             | B2-U0-G2   | 12,736                        | 98             | B4-U0-G2   |
| DMS50-180W80LED3K-T | 80         | 700              | 174                               | 3000K       | 15,924                        | 91             | B3-U0-G2   | 15,801                        | 91             | B2-U0-G2   | 15,782                        | 91             | B2-U0-G3   | 15,951                        | 92             | B4-U0-G2   |

1. System input wattage may vary based on input voltage, by up to +/- 10%, and based on manufacturer forward voltage, by up to +/- 8%.

2. Lumen values based on photometric tests performed in compliance with IESNA LM-79.

**Note:** Some data may be scaled based on tests of similar, but not identical, luminaires.

FIGURE 4-O

# DMS50 Domus LED pendant

## Urban luminaire

### LED Wattage and Lumen Values: 3000K Domus luminaire (continued)

| Globe (ACDR)        |            |                  |                                   |             | Type LE2A                     |                |            | Type LE3A                     |                |            | Type LE4A                     |                |            |
|---------------------|------------|------------------|-----------------------------------|-------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|-------------------------------|----------------|------------|
| Ordering Code       | Total LEDs | LED Current (mA) | Average System Watts <sup>1</sup> | Color Temp. | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating | Delivered Lumens <sup>2</sup> | Efficacy (LPW) | BUG Rating |
| DMS50-35W32LED3K-T  | 32         | 350              | 37                                | 3000K       | 3,731                         | 101            | B1-U2-G1   | 3,686                         | 99             | B1-U2-G1   | 3,664                         | 99             | B1-U2-G2   |
| DMS50-55W32LED3K-T  | 32         | 530              | 55                                | 3000K       | 5,366                         | 98             | B1-U3-G1   | 5,302                         | 96             | B1-U3-G2   | 5,269                         | 96             | B1-U3-G2   |
| DMS50-72W32LED3K-T  | 32         | 700              | 73                                | 3000K       | 6,755                         | 93             | B1-U3-G2   | 6,674                         | 92             | B1-U3-G2   | 6,633                         | 91             | B1-U3-G2   |
| DMS50-55W48LED3K-T  | 48         | 350              | 54                                | 3000K       | 5,581                         | 104            | B1-U3-G1   | 5,514                         | 103            | B1-U3-G2   | 5,480                         | 102            | B1-U3-G2   |
| DMS50-80W48LED3K-T  | 48         | 530              | 80                                | 3000K       | 7,984                         | 100            | B2-U3-G2   | 7,888                         | 99             | B1-U3-G2   | 7,839                         | 98             | B1-U3-G2   |
| DMS50-108W48LED3K-T | 48         | 700              | 106                               | 3000K       | 10,026                        | 95             | B2-U3-G2   | 9,906                         | 94             | B2-U3-G2   | 9,845                         | 93             | B2-U3-G3   |
| DMS50-70W64LED3K-T  | 64         | 350              | 69                                | 3000K       | 7,153                         | 103            | B2-U3-G2   | 7,025                         | 101            | B2-U3-G2   | 7,072                         | 102            | B1-U3-G2   |
| DMS50-110W64LED3K-T | 64         | 530              | 105                               | 3000K       | 10,253                        | 97             | B2-U3-G2   | 10,069                        | 96             | B2-U3-G2   | 10,137                        | 96             | B2-U3-G3   |
| DMS50-145W64LED3K-T | 64         | 700              | 141                               | 3000K       | 12,881                        | 92             | B3-U3-G3   | 12,651                        | 90             | B2-U3-G2   | 12,736                        | 91             | B2-U3-G3   |
| DMS50-90W80LED3K-T  | 80         | 350              | 86                                | 3000K       | 8,928                         | 104            | B2-U3-G2   | 8,768                         | 102            | B2-U3-G2   | 8,827                         | 103            | B2-U3-G2   |
| DMS50-135W80LED3K-T | 80         | 530              | 131                               | 3000K       | 12,753                        | 98             | B3-U3-G3   | 12,525                        | 96             | B2-U3-G2   | 12,609                        | 97             | B2-U3-G3   |
| DMS50-180W80LED3K-T | 80         | 700              | 174                               | 3000K       | 15,972                        | 92             | B3-U3-G3   | 15,687                        | 90             | B3-U3-G3   | 15,792                        | 91             | B3-U3-G3   |

1. System input wattage may vary based on input voltage, by up to +/- 10%, and based on manufacturer forward voltage, by up to +/- 8%.

2. Lumen values based on photometric tests performed in compliance with IESNA LM-79.

**Note:** Some data may be scaled based on tests of similar, but not identical, luminaires.

### Specifications:

#### Housing

In a round shape, this housing is made of die cast A380 aluminum, c/w a watertight grommet, mechanically assembled to the bracket with four bolts 5/16 18 UNC. This suspension system permits for a full rotation of the luminaire in 90° increments.

#### Access-mechanism

A die cast A360 aluminum technical ring with latch, hinge and a cast in decorative skirt. The mechanism shall offer tool free access to the inside of the luminaire. An embedded memory retentive gasket shall ensure weatherproofing.

#### Light engine

LEDgine composed of 5 main components:

**Heat Sink / Lens / LED lamp / Driver / Optical System**

Electrical components are RoHS compliant.

#### LED engine

LED type: Philips Lumileds LUXEON T. Composed of high-performance white LEDs. Color temperature as per ANSI/NEMA bin Neutral White, 4000 Kelvin nominal (3985K +/- 275K or 3710K to 4260K) or Warm white, 3000 Kelvin nominal (3045K +/- 175K or 2870K to 3220K), CRI 70 Min. 75 Typical.

#### Lens

**LExF / LExS:** Made of soda lime tempered glass lens, mechanically assembled and sealed onto the lower part of the heat sink.

**LExA (Globe):** Made of one-piece seamless injection-molded impact-resistant (DR) acrylic having an inner prismatic surface. The globe is mechanically assembled and sealed onto the lower part of the heat sink.

#### Heat sink

Made of cast aluminum optimizing the LEDs efficiency and life. Product does not use any cooling device with moving parts (only passive cooling device).

#### Driver

Driver comes standard with dimming compatible 0-10V. High power factor of 95%. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. Maximum ambient operating temperature from 40F(40C) to 130F(55C) degrees. Certified in compliance to UL1310 cULus requirement. Dry and damp location. Assembled on a unitized removable tray with Tyco quick disconnect plug resisting to 221F(105C) degrees. The current supplying the LEDs will be reduced

by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min).

#### Optical system

Composed of high performance optical grade PMMA acrylic refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Optical system is rated IP66. Performance shall be tested per LM 63, LM 79 and TM 15 (IESNA) certifying its photometric performance. Street side indicated. Flat lens (F optics) is Dark Sky compliant with 0% uplight and U0 per IESNA TM 15.



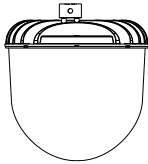
# DMS50 Domus LED pendant

## Urban luminaire

### Specifications (continued):

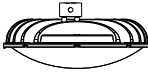
#### Optical system (continued):

**Prismatic globe:** IP66 rated optical system, composed of individual pre-oriented lens to achieve desired distribution, assembled with globe having an inner prismatic surface permanently sealed onto the lower part of the heat sink.



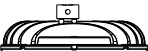
**LE2A** - Type II (ASYM) with globe (ACDR)  
**LE3A** - Type III (ASYM) with globe (ACDR)  
**LE4A** - Type IV (ASYM) with globe (ACDR)

**Sag lens:** IP66 rated optical system, composed of individual pre-oriented lens to achieve desired distribution, assembled with a tempered-glass sag lens permanently sealed onto the lower part of the heat sink.



**LE2S** - Type II (ASYM) Sag glass lens  
**LE3S** - Type III (ASYM) Sag glass lens  
**LE4S** - Type IV (ASYM) Sag glass lens  
**LE5S** - Type V (SYMM) Sag glass lens

**Flat lens:** IP66 rated optical system, composed of individual pre-oriented lens to achieve desired distribution, assembled with a tempered-glass flat lens permanently sealed onto the lower part of the heat sink.



**LE2F** - Type II (ASYM) Flat glass lens  
**LE3F** - Type III (ASYM) Flat glass lens  
**LE4F** - Type IV (ASYM) Flat glass lens  
**LE5F** - Type V (SYMM) Flat glass lens

#### Driver options

**AST:** Pre-set driver for progressive start-up of the LED module(s) to optimize energy management and enhance visual comfort at start-up.

**CLO:** Pre-set driver to manage the lumen depreciation by adjusting the power given to the LEDs offering the same lighting intensity during the entire lifespan of the LED module.

**DALI:** Pre-set driver compatible with the DALI control system.

**OTL:** Pre-set driver to signal end of life of the LED module(s) for better fixture management.

**DMG:** Dimmable driver 0-10V.

**CDMG:** Dynadimmer standard dimming functionalities including pre-programmed scenarios to suit many applications and needs from safety to maximum energy savings.

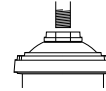
| Ordering Code | Scenario | Dimming Time | Dimming Level     |
|---------------|----------|--------------|-------------------|
| CDMG525       | Safety   | 4 hours      | 25% power dimming |
| CDMG550       | Safety   | 4 hours      | 50% power dimming |
| CDMG575       | Safety   | 4 hours      | 75% power dimming |
| CDMG25        | Median   | 6 hours      | 25% power dimming |
| CDMG50        | Median   | 6 hours      | 50% power dimming |
| CDMG75        | Median   | 6 hours      | 75% power dimming |
| CDMGE25       | Economy  | 8 hours      | 25% power dimming |
| CDMGE50       | Economy  | 8 hours      | 50% power dimming |
| CDMGE75       | Economy  | 8 hours      | 75% power dimming |

#### Surge protector

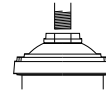
Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA. **SP2** 20kV/20kA optional.

#### Luminaire adaptor

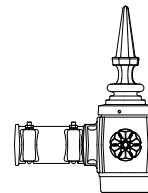
**MA1:** The luminaire is suspended by means of a mounting adaptor with a 1¼" (32mm) NPT threaded hole accepting a threaded tube from the mounting. Retrofit adaptor for existing mounting.



**MA2:** 1½" (38mm) NPT threaded hole accepting threaded tube from the mounting. Retrofit adaptor for existing mounting.



**SMA:** The luminaire is suspended by means of a decorative side-mounted cast aluminum adaptor. This adaptor accepts tubes from 1½" to 2¾" (41 to 60mm) and is adjustable to more or less 5°. The adaptor features a cast aluminum decorative cover and finial.



**SMB:** The luminaire is suspended by means of a decorative side-mounted cast aluminum adaptor. This adaptor accepts tubes from 1½" to 2¾" (41 to 60mm) and is adjustable to more or less 5°.

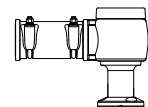


FIGURE 4-O

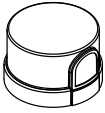
# DMS50 Domus LED pendant

## Urban luminaire

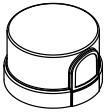
### Specifications (continued):

#### Luminaire options

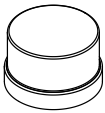
|             |                                 |
|-------------|---------------------------------|
| <b>BO:</b>  | Bridge and Overpass             |
| <b>HS:</b>  | House side shield               |
| <b>PH7:</b> | Photoelectric cell, bottom type |



|              |                                                                                 |
|--------------|---------------------------------------------------------------------------------|
| <b>PH8:</b>  | Photoelectric Cell, Twist-lock Type. Allows a 90 degree rotation.               |
| <b>PHXL:</b> | Extended life photoelectric cell, Twist-lock Type. Allows a 90 degree rotation. |



|             |                               |
|-------------|-------------------------------|
| <b>PH9:</b> | Shorting cap, Twist-lock Type |
|-------------|-------------------------------|



|            |                   |
|------------|-------------------|
| <b>RC:</b> | Receptacle 3 pins |
|------------|-------------------|



|             |                   |
|-------------|-------------------|
| <b>RCD:</b> | Receptacle 5 pins |
|-------------|-------------------|



|              |                   |
|--------------|-------------------|
| <b>RCD7:</b> | Receptacle 7 pins |
|--------------|-------------------|



|             |                          |
|-------------|--------------------------|
| <b>SP2:</b> | Integral surge protector |
|-------------|--------------------------|

#### Finish

In accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with +/- 1 mils/24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. The surface treatment achieves a minimum of 2000 hours for salt spray resistant finish in accordance with testing performed and per ASTM B117 standard.

##### Finish Options Include:

**BE2TX:** Textured Midnight Blue  
**BE6TX:** Textured Ocean Blue  
**BE8TX:** Textured Royal Blue  
**BG2TX:** Textured Sandstone  
**BKTX:** Textured Black  
**BRTX:** Textured Bronze  
**GN4TX:** Textured Blue Green  
**GN6TX:** Textured Forest Green  
**GN8TX:** Textured Dark Forest Green  
**GNTX:** Textured Green  
**GR:** Gray Sandtex  
**GY3TX:** Textured Medium Grey  
**NP:** Natural Aluminum  
**RD2TX:** Textured Burgundy  
**RD4TX:** Textured Scarlet  
**TG:** Hammer-tone Gold  
**WHTX:** Textured White

#### Wiring

Gauge (#14) TEW/AWM 1015 or 1230 wires, 6" (152mm) minimum exceeding from luminaire.

#### Hardware

All exposed screws shall be complete with Ceramic primer-seal base coat to reduce seizing of the parts and offers a high resistance to corrosion. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

#### Luminaire useful life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, Philips System Reliability Tool, Philips Advance data and Philips Lumileds LM-80/TM-21 data, expected to reach 100,000+ hours with >L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion. Entire luminaire is rated for operation in ambient temperature of -40°C / -40°F up to +35°C / +95°F.

#### LED products (manufacturing standard)

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340 5 1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

#### Quality control

Manufactured to ISO 9001 2008 standards and ISO 14001-2004 International Quality Standards Certification.

#### Vibration resistance

Meets the ANSI C136.31, American National Standard for Roadway Luminaire Vibration specifications for Bridge/overpass applications. (Tested for 3G over 100 000 cycles)

#### Certifications and Compliance

CSA, cULus Listed for Canada and USA. Domus LED luminaires are DesignLights Consortium qualified.



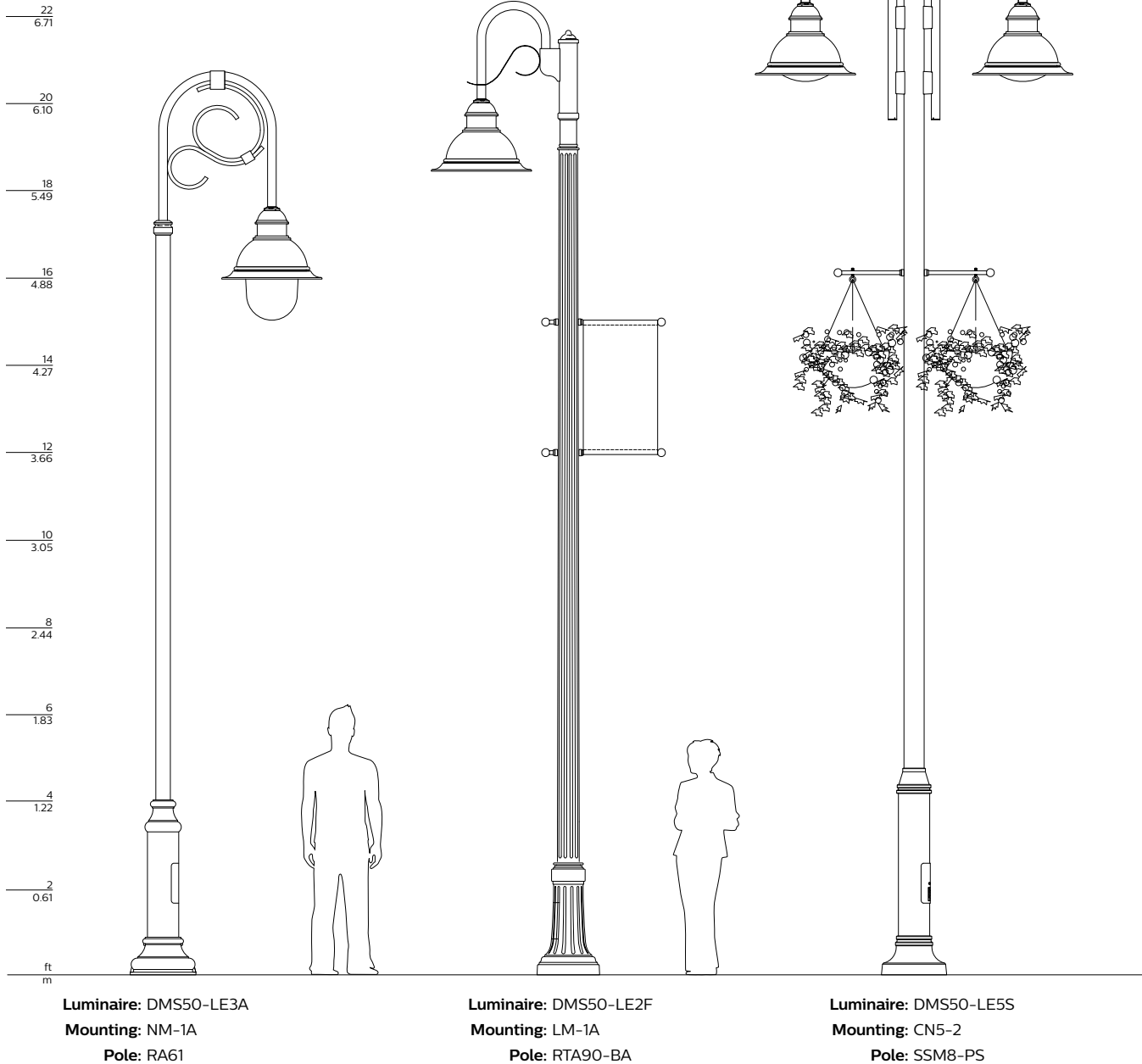
FIGURE 4-O

# DMS50 Domus LED pendant

## Urban luminaire

### Specifications (continued):

#### Poles & Brackets Sample configurations.



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281 Hillmount Rd, Markham, ON, Canada L6C 2S3  
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For FIGURE 5-A See Supplement



FIGURE 5-B

## BURLINGTON CITY CENTER PHASE I OCCUPANCY SCHEDULE

The occupancy of Burlington City Center will occur in a logical manner based on current and future anticipated market conditions and the extension of infrastructure. This occupancy is anticipated to occur in multiple phases between March 2019 through June 2020.

The project is organized into three main parts – 1) a five-story mixed-use podium, 2) a six-story office tower and 3) an eight-story residential tower with the lower two floors containing office occupancy. Occupancy will follow the general construction sequence for the project.

The first phase of occupancy will include the retail space along Cherry and Bank streets, two levels of office space (UVMCC) in the residential tower, and the lower two levels of the parking garage. To support this phase of occupancy, the Cherry St. and Bank St. public improvements will be completed including the access to the parking garage and loading dock. It is anticipated that occupancy will occur on March 1, 2019.

The second phase of occupancy will include the collegiate housing located in the east wing of the residential tower, 103 units, the “wrap” housing that encloses the parking garage on two sides, 61 units, the office tower and the remaining two levels of the parking garage. It is anticipated that occupancy will occur on December 31, 2019.

The final phase of occupancy will include the retail space along St. Paul and Pine streets and the remaining residential tower units, 109 units. This will be supported by the opening of the new St. Paul St. and Pine St. It is anticipated that occupancy will occur on May 1, 2020.

A summary of the anticipated occupancy schedule is below:

### 1<sup>st</sup> Phase of Occupancy

|                                      |          |
|--------------------------------------|----------|
| UVMCC Office Space                   | 3/1/2019 |
| Parking Garage   Levels P + L2       | 3/1/2019 |
| Cherry St. + Bank St. Improvements   | 3/1/2019 |
| Retail Space   Bank + Cherry Facades | 3/1/2019 |

### 2<sup>nd</sup> Phase of Occupancy

|                                            |            |           |
|--------------------------------------------|------------|-----------|
| Residential Tower – East Wing (Collegiate) | 12/31/2019 | 103 Units |
| Residential Housing (Parking Garage Wrap)  | 12/31/2019 | 61 Units  |
| Office Tower                               | 12/31/2019 |           |
| Parking Garage   Levels L3 + L4            | 12/31/2019 |           |

### 3<sup>rd</sup> Phase of Occupancy

|                                            |          |           |
|--------------------------------------------|----------|-----------|
| Residential Tower – Center + West Wings    | 5/1/2020 | 109 Units |
| Retail Space   St. Paul + Pine St. Facades | 5/1/2020 |           |
| St. Paul St. + Pine St. Improvements       | 5/1/2020 |           |



## Memorandum

To: Devonwood Investors, LLC

Date: December 13, 2016

Project #: 57881.00

From: Jason Ross, Director of Noise and  
Vibration

Re: Noise Impact Assessment for Burlington Town Center

## Introduction

VHB has conducted a noise assessment of the proposed Burlington Town Center multi-use development project in Burlington, VT. The development has the potential to introduce new stationary and mobile sources of noise that could potentially affect the existing community. The development would introduce new stationary sources including rooftop mechanical equipment and outdoor use of a rooftop park. Increased retail, office, residential and preschool space would generate vehicle trips that have the potential to increase traffic noise. This noise impact memo provides background on the proposed development, describes applicable noise impact criteria and qualitatively assesses the potential for impact.

## Background

The proposed project would include demolishing the existing Town Center Mall and construction of a mixed-use development including office, residential, preschool, retail and parking. The building would be fourteen stories tall (approximately 158 feet) with mechanical equipment enclosed on the rooftop level. The development will include uses similar to the existing uses on site. Retail spaces would generally be on the concourse, first and second floors, parking would be on the third, fourth and fifth floors, an outdoor tenant park would be on the fifth floor (fourth floor roof), office space would be on the third to tenth floors and residential space would be on the seventh to 14<sup>th</sup> floors.

## Noise Ordinance

There are no federal or state-level noise regulations in Vermont that apply to evaluate potential noise effects due to the proposed development. Additionally, the project is not subject to environmental review pursuant to the Act 250 program administered by the Natural Resources Board.

The Burlington Noise Code (Section 21-13) "Noise Ordinance" is intended to preserve the public health, safety and welfare by prohibiting excessive and disturbing noise. Specific noise-generating activities are prohibited including the following that may be applicable to the proposed development:

- making "loud or unreasonable" noise which disturbs, injures or endangers the peace or health of another;
- operating radios, television, musical instruments or similar devices that is plainly audible from another property or from the street between the hours of 10:00 PM and 7:00 AM;
- parties and social events that generate unreasonably loud noise or is plainly audible between the hours of 10:00 PM and 7:00 AM at another property or at the street;
- construction activities between 9:00 PM and 7:00 AM; and
- use of loudspeakers for the purpose of attracting the attention of the public to a building.

40 IDX Drive  
Building 100, Suite 200  
South Burlington, VT 05403-7771  
P 802.497.6100



Ref: 57881.00  
December 13, 2016  
Page 2

## Noise Impact Assessment

The development will include retail and office uses similar in nature and character to existing uses on the site and on abutting parcels typical of the downtown. Noise-sensitive receptors near the proposed development include retail and residential buildings on Bank Street to the south, retail properties to the east and west and residences and the Cathedral of the Immaculate Conception to the north.

The project would not be expected to include specific noise-generating activities which are prohibited according to the Noise Code such as making loud or unreasonable noise, operating radios, televisions, musical instruments or similar devices that could be audible from other properties or the street, and parties or social events that generate plainly audible noise between 10:00 PM and 7:00 AM.

Parking, loading docks and trash and recycling facilities will be located within the building which would improve current conditions. The outdoor fifth floor tenant park will only be accessible to office tenants and the pre-kindergarten program during normal business hours which would be outside the hours of 10:00PM and 7:00 AM when loud and unreasonable events are prohibited.

Specific details including location, types and sizes of stationary mechanical equipment such as condenser units and generators are not known at this time. Standard mechanical equipment will be located on the building roofs and would likely be enclosed which would substantially reduce noise to the community.

As described in the Traffic Impact Study, the proposed development would increase traffic volumes in the area up to 4% on major gateways such as North Avenue, Route 127, Colchester Avenue, Pine Street, Shelburne Road (US 7) and Main Street (US 2) during the peak afternoon hour. Vehicle trips generated by the development would be primarily automobiles based on the retail, office and residential uses of the property. This increase in traffic volumes would result in a negligible (less than 0.2 dB) increase in noise due to additional mobile sources.

Construction of the proposed development would involve equipment and methods typical of mixed-use development projects in the region. As feasible, construction of the proposed facility would not occur during the hours of 9:00 PM and 7:00 AM which is prohibited according to the town ordinance.

## Conclusions

The proposed development would not result in adverse noise impact according to the Burlington Noise Ordinance as it relates to the introduction of new stationary sources including rooftop mechanical equipment, increases in traffic volumes due to the additional retail, office and residential uses or construction-period activities.

### **DUST MITIGATION & CONTROL MEASURES**

PC Construction takes dust control seriously on all its project sites and recognizes the City of Burlington's concern about controlling dust during the entirety of the project. As such, the following dust control measures are proposed:

- During dry conditions, soil disturbance areas will be visually monitored by onsite PC Construction supervision / personnel that are experienced in proactively identifying areas needing dust control before visible dust is generated. When such areas are identified, the contractor will preemptively employ appropriate dust mitigation measures/practices. It will be the responsibility of the contractor and applicable subcontractors to perform the dust mitigation measures.
- Dust mitigation will be addressed via the use of calcium chloride amended water that will be applied to roadways, access corridors, soil excavation areas, demolition areas, soil stockpiles, and/or other areas where dust may be generated; however, care will be taken not to produce a condition where runoff results. Water will be applied to potential areas of concern via industrial fan misters, sprinklers, water trucks, and/or other similar methods.
- Should visible dust be observed, work will temporarily cease until adequate water application is achieved and no visible dust is being generated. In addition to water application, other dust mitigation practices may be employed during windy, dry conditions when dust is most likely to be generated. These additional practices will include reduction of truck traffic speeds and a general increased level of care during excavation and soil loading activities (e.g. place bucket of soil as opposed to dumping it from some height). As part of the design plan, an Erosion Prevention and Sediment Control Plan will be prepared which will further address dust mitigation measures.

Heavy equipment will be utilized for demolition of structures, processing of debris and haulage of said material, as well as movement of vehicles at the work site, and movement of demolition materials.

- Dust control will be provided by routine spraying and dependent upon weather conditions at the time, i.e., wind, temperature, use of haul roads, type of debris being processed) with water trucks or fire hoses.

The following locations are the main areas of work for the project and may or may not generate dust:

- Lay-down area
- Foot print of the work area
- Processing of debris
- Equipment travel path
- Mobilization and De-mobilization of equipment
- Demolition of structures and foundations



## **10.0 APPENDIX – DOWNTOWN MIXED USE CORE OVERLAY COMPLIANCE CHECKLIST**

Instructions:

The Downtown Mixed Use Core Overlay Compliance Checklist is a tool to be use for documentation and confirmation of compliance with the requirements of Sec. 4.5.8 Downtown Mixed Use Core Overlay (DMUC) District. This checklist documents compliance **only** with the requirements of Sec. 4.5.8. Other sections of the CDO as applicable (e.g. Art 8 Parking, Art 9 Inclusionary and Replacement Housing) also require documentation of compliance.

The ordinance requirements listed in the first column are in some cases **only a summary** of the requirements found in the CDO. Any questions or conflicts should refer back to the CDO itself for clarification. The Applicant Compliance Documentation should be as brief as necessary to convey how compliance with the requirements have been achieved, and should reference related plans and illustrations as appropriate.

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Applicant Compliance Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Staff Compliance Confirmation                                                                                           |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <b><u>Sec. 4.5.8 Downtown Mixed Use Core Overlay (DMUC) District</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <b>(a) Purpose:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <p>The Downtown Mixed Use Core Overlay (DMUC) district is intended to facilitate the redevelopment of a portion of the former Urban Renewal Area in order to provide for a more walkable, connected, dense, compact, mixed use and diverse urban center. The area should support a diversity of residential, commercial, recreational, educational, civic, hospitality, and entertainment activities, and create opportunities to better connect the street grid for enhanced mobility for automobiles, pedestrians, and bicyclists in order to sustain and advance the economic vitality Burlington’s downtown urban core.</p> <p>This overlay allows larger scale development than is typically found in the underlying district, and development with larger and taller buildings. Development should be designed to support the diverse mixed-uses, activate and enrich the street and sidewalk for pedestrian activity, and encourage mobility throughout the district and adjacent districts for pedestrians and bicyclists with reduced reliance on automobiles.</p> | <p>The proposed development is a multi-use project within the Downtown Mixed Use Core Overlay (DMUC) District on the project site presently occupied by Burlington Town Center Mall at 49 Church Street. The proposed uses include retail, residential, office, and parking.</p> <p>Two of the project parcels will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul’s Street, between Cherry and Bank Streets.</p> | <p><input type="checkbox"/> In compliance<br/><input type="checkbox"/> Not in compliance</p> <p><u>Explanation:</u></p> |
| <b>(b) Areas Covered:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <p>The Downtown Mixed Use Core Overlay (DMUC) district includes those portions of the Mixed Use Downtown (D) District as delineated on Map 4.5.8-1.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>See Project Narrative section 2.1.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p><input type="checkbox"/> In compliance<br/><input type="checkbox"/> Not in compliance</p> <p><u>Explanation:</u></p> |
| <b>(c) District Specific Regulations: Downtown Mixed Use Core Overlay (DMUC) district;</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <b><u>1. Dimensional Standards:</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <p>The maximum Building height and mass shall be as prescribed in Table 4.5.8-1 below. Building height and mass in excess of 65-feet and 5.5 FAR shall be allowed by-right and without the necessity of the DRB granting of Development Bonuses/Additional Allowances pursuant to Sec 4.4.1 (d)7.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                         |
| <p>Any application requiring Major Impact Review pursuant to Sec. 3.5.2 (b) shall not also be subject to Conditional Use Review (Sec. 3.5.2 (a)) unless a use specifically identified in Appendix A – Use Table as a “Conditional Use” or identified as “CU” is also proposed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <p>Documentation of compliance with the requirements of Art. 3 Part 5 Conditional Use and Major Impact Review as applicable should be made separate from this checklist.</p>                                                                                                                                                                                                                                                                                                            |                                                                                                                         |



| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                          | Applicant Compliance Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Staff Compliance Confirmation                                                                               |
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| The Dimensional Standards within the DMUC Overlay District shall be as follows:                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                             |
| <b>Building Height:</b> 3 stories min, 14 stories not to exceed 160-ft max                                                                                                                                                                                                                                                  | See drawing Z-021 Zoning Sections.<br>South Tower = 12 Stories (+ Excluded Mechanical Level): <ul style="list-style-type: none"><li>152’-8” above average grade at Bank Street.</li><li>148’-11” above average grade at St. Paul Street.</li></ul> North Towers = 14 Stories (+ Excluded Mechanical Level): <ul style="list-style-type: none"><li>159’-7” above average grade at Cherry Street.</li><li>157’-10” above average grade at St. Paul Street.</li><li>162’-2”* above average grade at Pine Street.</li></ul> * 2’-2” Height Variation is within 5% of 160’-0” height allowed. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>FAR:</b> 9.5 FAR total max per lot                                                                                                                                                                                                                                                                                       | See Project Narrative section 2.3.<br>965,352 GSF / 109,779 Site Area = <b>8.79 PROPOSED FAR</b> <9.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>Floorplate:</b><br>Floors 1-5 100% of lot max.<br>Floors 6-8 80% of lot max.<br>Floors 9-12 55% of lot max.<br>Floors 13+ 15, 000 sf max per individual floorplate, with individual towers separated by a minimum of 60-ft measured orthogonally.<br>The floorplate of any floor may not be larger than the floor below. | See Project Narrative section 2.3 (Floorplate Compliance Checklist – Proposed), drawing Z-001, and Z-002 Lot Coverage Diagrams.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>Pervious Area:</b> 10% min                                                                                                                                                                                                                                                                                               | See Project Narrative section 2.3, 2.12, 2.14, and drawings A-052 and A-053 Floor Plans.<br>Required Pervious Area = 109,779 sf x 10% = 10,978 sf<br>Proposed Pervious Area = <b>11,015</b> sf = <b>10.03%</b>                                                                                                                                                                                                                                                                                                                                                                           | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>Setbacks:</b><br>- Front: 0-ft min, 10-ft max. In no event shall a Building be closer than 12’ from the curb.<br>- Side/Rear: 0-ft min, 12-ft max.                                                                                                                                                                       | See Project Narrative sections 2.3, 2.4, and drawing Z-021 Zoning Sections.<br>South Tower: 0-ft Setback from Property Lines; 18-ft. from curb at Bank St., 15-ft. from curb at St. Paul St.;<br>North Tower: 0-ft. Setback from Property Lines; 18-ft. from curb at Cherry St., 15-ft. from curb at Pine and St Paul Streets.                                                                                                                                                                                                                                                           | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>Occupied Build-to Zone:</b> 100%                                                                                                                                                                                                                                                                                         | See Project Narrative sections 2.3, 2.14, and drawing A-051 Floor Plans.<br>109,779 sf Lot Size – 1,557 sf Pavement within property lines = 108,222 = 98.6%                                                                                                                                                                                                                                                                                                                                                                                                                              | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Applicant Compliance Documentation                                                                                                                                                                            | Staff Compliance Confirmation                                                                                                                          |
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| Ground Floor Height (floor to floor): 14-ft min                                                                                                                                                                                                                                                                                                                                                                                                                                                        | See Project Narrative section 2.6, drawing A-211, and A-212 Building Sections.<br><br>Ground floor heights (floor to floor) are typically 15’-6”, but vary per retail tenant space and meet or exceed 14’-0”. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| Arcades: 10-ft min clear depth, 14-ft min clear height                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Not Applicable.                                                                                                                                                                                               | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>2. Urban Design Standards:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                               |                                                                                                                                                        |
| The following urban design standards shall apply to all Buildings in the DMUC Overlay, and the DRB shall make a final determination regarding strict compliance with these standards except as provided for in E below. These standards and requirements shall take precedence without limitation over any duplicative or conflicting provisions of Article 6, and compliance with Article 6 shall be presumed where a Building is in compliance with these design standards as determined by the DRB. |                                                                                                                                                                                                               |                                                                                                                                                        |
| A. Overall Design: Proposed Buildings shall present an architecturally significant design as follows:                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                               |                                                                                                                                                        |
| i. Step backs, horizontal and vertical variation, selection of materials and other architectural design techniques are used to reinforce the street wall, create transitions from adjacent buildings of a smaller mass and height, and reduce the perceived height and mass of the upper stories from the street level;                                                                                                                                                                                | See Project Narrative section 2.4, drawing A-201, and A-202 Building Elevations.                                                                                                                              | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| ii. Proposed Buildings provide visual interest and human scale at the pedestrian level through the use of a variety of scales, materials, fenestration, massing or other architectural design techniques;                                                                                                                                                                                                                                                                                              | See Project Narrative section 2.4, drawing A-201, and A-202 Building Elevations.                                                                                                                              | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| iii. Upper story proportions of Buildings emphasize vertically-oriented proportions to assure a rich visually interesting experience as viewed within the context of the downtown skyline, reinforce opportunities for establishing points of reference for visual orientation, and retain opportunities for a view of the sky between individual Building elements.                                                                                                                                   | See Project Narrative section 2.4, drawing A-201, and A-202 Building Elevations.                                                                                                                              | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |



| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                 | Applicant Compliance Documentation                                                                                                                                                                                                                                                                                                                                                                                                                     | Staff Compliance Confirmation                                                                                                                          |
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| B. <b>Façade Articulation:</b> All street-facing Building facades shall be articulated as follows:                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                        |
| i. Building facades shall incorporate at least three (3) methods of surface relief which must either recess or project from the average plane of the facade by at least four (4) inches.                                                                                                                                                                                                                                                                           | See Project Narrative section 2.4, drawing A-201, and A-202 Building Elevations.<br>1.) Top of Building 6” cornice.<br>2.) 18” offset at corner of brick façade.<br>3.) 4” setback at glazing.<br>4.) Spandrel Panel projects 4” from face of glazing.<br>5.) Bay window 18” projection.<br>6.) 42” Recessed Balcony.<br>7.) Vertical articulation 9” projection.<br>8.) 10’-0” Recessed building entry.<br>9.) Storefront awning and entrance canopy. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| ii. Buildings with facades between 75-150 feet in width shall include vertical changes through the horizontal plane of the Façade by dividing the facade into a series of architectural and/or structural bays between 6-65 feet in width involving up to a minimum of 50% of the height of the façade.                                                                                                                                                            | See drawings A-201 and A-202 Building Elevations.<br>Structural bays are provided running the entire height of building facades. Widths of bays varies, typically from 18’-0” min to 28’-0” max.                                                                                                                                                                                                                                                       | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| iii. Buildings with facades greater than 150 feet in width must include a more substantial change in the horizontal plane of the façade where for every 150 feet in facade width, 1 or more architectural bay as required above must either recess or project by at least 4 feet involving the full height of the façade from the average plane of the street wall portion of the facade. Such bays shall occur no closer than 50 feet from the Building’s corner. | See drawings A-201 and A-202 Building Elevations.<br>Facades exceed 150’-0” in length and include differentials massing and setbacks above street wall façade. Recessed entryways are set in 10’-0” from the main façade and continue to the upper stories to create vertical expression.                                                                                                                                                              | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| iv. Required Building Height Setbacks pursuant to Sec 4.4.1 (d) 4 shall not be applicable. Instead, upper stories of any street-facing Building facade exceeding 6 stories in height shall be setback as follows:                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                        |
| a. An upper story setback at least 10 feet from the primary plane of the façade below shall occur within the first 60-ft of Building height at either the 3rd, 4th, or 5th story. Such a change shall involve the full width of the Building façade, but does not have to occur in the same story.                                                                                                                                                                 | See drawing Z-021 Zoning Sections.<br>A 10’-0” setback is provided at the 5 <sup>th</sup> floor of the North Tower and the 6 <sup>th</sup> floor of the South Tower, both within 60’-0” from average grade.                                                                                                                                                                                                                                            | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| b. For Buildings exceeding 10 stories in height a second upper story setback at least ten (10) feet from the primary plane of the façade below shall occur at either the 10th, 11th, or 12th story. Such a change shall involve the full width of the Building façade, but does not have to occur in the same story.                                                                                                                                               | See drawing Z-021 Zoning Sections.<br>A 10’-0” setback is provided at the 10th floor of the South Tower. The North Tower has multiple setbacks of at least 10’-0” at either the 7 <sup>th</sup> floor, 11 <sup>th</sup> floor, or 12 <sup>th</sup> floor.                                                                                                                                                                                              | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                       | Applicant Compliance Documentation                                                                                                                                                                                                                                                                        | Staff Compliance Confirmation                                                                                                                          |
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| c. Setbacks must be visually set off from the stories below by a balustrade, parapet, cornice and/or similar architectural feature, and are encouraged to be activated as an outdoor amenity space for Building occupants.                                                                                                               | See drawing Z-021 Zoning Sections; A-051, A-052, & A-053 Floor Plans; and A-201 and A-202 Building Elevations.<br><br>Setbacks are visually offset from stories below by material changes and in some places railings. The setbacks provided are activated as outdoor amenities for tenants and visitors. | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| d. The upper stories beyond a setback may be visually differentiated from the stories below by a change in color, materials and/or pattern of fenestration in order to reduce the actual or perceived massing of the Building overall.                                                                                                   | See drawings A-201 and A-202 Building Elevations.<br><br>Setbacks are visually offset from stories below by material changes and fenestration patterns.                                                                                                                                                   | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| v. Where visible, the raised foundation or basement of a Building shall not exceed 4-ft as measured from the exterior finished grade to the finished floor of the Story above, and must be visually differentiated from the stories above by a horizontal expression line and change in color, material, and/or pattern of fenestration; | Not Applicable.                                                                                                                                                                                                                                                                                           | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| vi. The lower 1-5 stories of a Building must be visually differentiated from the stories above by a horizontal expression across a majority of the facade; and,                                                                                                                                                                          | See drawings A-201 and A-202 Building Elevations.<br><br>The streetwall façade extends from grade to the 5 <sup>th</sup> floor North Tower/6 <sup>th</sup> floor South Tower, which provides a horizontal expression across the majority of the façade.                                                   | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| vii. The top 1-5 stories of a Building must be visually differentiated from the stories below by a horizontal expression across a majority of the façade                                                                                                                                                                                 | See drawings A-201 and A-202 Building Elevations.<br><br>The massing of the upper stories is broken up, and higher setbacks are provided, articulating horizontal expression at each massing.                                                                                                             | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| viii. The top of a Building must have an expression of the Buildings top involving a projection from the average plane of the facade by at least 6 inches.                                                                                                                                                                               | See drawings A-201 and A-202 Building Elevations.<br><br>The South Tower Mechanical level roof projects +/- <b>18”</b> over the outdoor setback below.<br><br>The North Tower provides a 6” stone projection at the roof level.                                                                           | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |



| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                    | Applicant Compliance Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                             | Staff Compliance Confirmation                                                                               |
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| 2.) <b>Street Activation:</b> All Buildings shall activate the street as follows:                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                             |
| i. Buildings shall have one or more principal entrances for pedestrians at street level that are clearly identified as such along the street frontage or at a corner where a corner lot.                                                                                                                                                                                                                              | See Project Narrative section 2.4 and drawing A-051 Floor Plans.<br><br>Multiple principal pedestrian entrances are provided and further expressed through canopies and signage.                                                                                                                                                                                                                                                                                               | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| ii. The linear distance along the street frontage between ground floor entries shall not exceed 60-feet, and such doors must be open and operable by residential occupants at all times and non-residential occupants and customers during business hours.                                                                                                                                                            | See drawing A-051 Floor Plans <b>and A201 and A-202 Building Elevations.</b><br><br>The distances between multiple ground floor entries varies. <b>Effort is taken to not exceed 60'-0", however due to the sloping site it is impossible to provide additional entries at St. Paul and Pine Streets and maintain a 5% maximum sidewalk slope.</b> Doors are operable by residential occupants at all times and non-residential occupants and customers during business hours. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| iii. Building entrances shall be defined and articulated by architectural elements appropriate to the architectural style and details of the Building as a whole. Bays including a principal entrance should be expressed vertically and continue onto the upper stories. Such bays are not required to include additional horizontal expression beyond what is required for any upper story setbacks                 | See drawings A-201 and A-202 Building Elevations.<br><br>Multiple principal pedestrian entrances are provided and continue to the upper stories to create vertical expression. Steel and glass canopies extend over the sidewalks.                                                                                                                                                                                                                                             | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| iv. Requirements regarding openings and the transparency of glazing in a street-facing Building facade shall be as follows:                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                             |
| <b>Rough openings for windows and doors</b> (per floor) <ul style="list-style-type: none"><li>- Ground Floor: 70% min, 80% of which shall be concentrated between 3-10 feet above the adjacent sidewalk</li><li>- Upper Floors: 20% min</li></ul> <i>May be reduced to 50 and 30% respectively to meet the requirements of a High Performance Building Energy Code or equivalent program as determined by the DRB</i> | See drawings A-201 and A-202 Building Elevations.<br><br>Ground floor rough openings: <ul style="list-style-type: none"><li>• Cherry Street: <b>79%</b></li><li>• St. Paul Street: <b>71%</b></li><li>• Bank Street: <b>77%</b></li><li>• Pine Street: <b>75%</b></li></ul><br>Upper Floor rough openings exceed 20% at all floors.                                                                                                                                            | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>Horizontal and vertical distance between rough openings:</b> 20' max.                                                                                                                                                                                                                                                                                                                                              | See drawings A-201 and A-202 Building Elevations.<br><br>Rough opening separations vary due to complexity but in no case exceed 20'-0" horizontally or vertically. Typical dimension is +/-4'-0".                                                                                                                                                                                                                                                                              | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>Transparency:</b> (applicable to 80% of the glazing on each floor) <ul style="list-style-type: none"><li>- VLT: 60% min ground floor, 40% min upper floors</li><li>- VLR: 15% max all floors</li></ul>                                                                                                                                                                                                             | See Project Narrative section 2.6.<br><br>VLT at ground floors is typically 60% or higher. VLT at upper floors is 40% or higher.<br><br>VLR is 15% or less for glazing at all floors.                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Applicant Compliance Documentation                                                                                                                                                                                                                                                        | Staff Compliance Confirmation                                                                                                   |
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| <div>v. Street-facing, street-level windows must allow views into a ground story non-residential use for a depth of at least 3 feet for the first 4 feet above the level of the finished sidewalk in order to provide for a window display, and for a depth of at least 8 feet for the next 4 feet above the level of the finished sidewalk in order to provide a view into the interior of the space. Windows cannot be made opaque by window treatments (except operable sunscreen devices within the conditioned space). External security shutters are not permitted.</div>                                                                                                                       | <div>See Project Narrative section 2.6 and drawings A-201 and A-202 Building Elevations.</div> <div>All Street level windows allow views into the ground story as per regulations.</div>                                                                                                  | <div><input type="checkbox"/> In compliance</div> <div><input type="checkbox"/> Not in compliance</div> <div>Explanation:</div> |
| <div>vi. In addition to the restriction regarding ground floor residential uses pursuant to Sec. 4.4.1, (d) 1 A, General Office uses shall also not be permitted on the ground floor of any building in the DMUC Overlay.</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <div>See Project Narrative section 2.6 and drawing A-051 Floor Plans.</div> <div>General office use is not provided at ground floor.</div>                                                                                                                                                | <div><input type="checkbox"/> In compliance</div> <div><input type="checkbox"/> Not in compliance</div> <div>Explanation:</div> |
| <div>3.) Materials:</div> <div>The following requirements regarding the selection and use of Building materials is intended to improve the physical quality and durability of buildings, enhance the pedestrian experience, and protect the character of the downtown area.</div>                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                           |                                                                                                                                 |
| <div>i. Primary Materials: Not less than 80 percent of each street-facing Facade shall be constructed of primary materials comprised of high quality, durable, and natural materials. For Facades over 100 square feet, more than one primary material shall be used. Changes between primary materials must occur only at inside corners. The following are considered acceptable primary materials:</div> <div>a. Brick and tile masonry;</div> <div>b. Native stone;</div> <div>c. Wood – panels, clapboard or shingles;</div> <div>d. Glass curtain wall; and,</div> <div>e. Cementitious siding;</div>                                                                                           | <div>See Project Narrative section 2.4 Proposed Exterior Finish Materials Table and drawings A-201 and A-202 Building Elevations. Also see FIGURES 4-A through 4-D.</div> <div>Primary materials consist of Brick-Faced Panels, Limestone Finished Panels, Glazing, and Stone Base.</div> | <div><input type="checkbox"/> In compliance</div> <div><input type="checkbox"/> Not in compliance</div> <div>Explanation:</div> |
| <div>ii. Accent Materials: The following accent materials may make up no more than 20% of the surface area on each street-facing façade. Accent materials are limited to:</div> <div>a. Pre-cast masonry (for trim and cornice elements only);</div> <div>b. External Insulation Finishing System - EIFS (for upper story trim and cornice elements only);</div> <div>c. Gypsum Reinforced Fiber Concrete (GFRC—for trim elements only);</div> <div>d. Metal (for beams, lintels, trim elements and ornamentation, and exterior architectural metal panels and cladding only);</div> <div>e. Split-faced block (for piers, foundation walls and chimneys only); and.</div> <div>f. Glass block.</div> | <div>See Project Narrative section 2.4 and drawings A-201 and A-202 Building Elevations. See FIGURE 4-E.</div> <div>Accent materials consist of Metal Panels.</div>                                                                                                                       | <div><input type="checkbox"/> In compliance</div> <div><input type="checkbox"/> Not in compliance</div> <div>Explanation:</div> |



| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Applicant Compliance Documentation | Staff Compliance Confirmation                                                                                                                                                  |
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| iii. Alternate Materials: Alternate materials, including high quality synthetic materials, may be approved by the administrative officer after seeking input from the Design Advisory Board. New materials must be considered equivalent or better than the materials listed above and must demonstrate successful, high quality local installations. Regionally-available materials are preferred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Not applicable.                    | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance as approved<br><input type="checkbox"/> Not in compliance as approved<br><u>Explanation:</u> |
| iv. Other:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |                                                                                                                                                                                |
| a. The use of recycled and/or regionally-sourced materials is strongly encouraged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                    |                                                                                                                                                                                |
| b. With the exception of natural wood siding or shingles such as cedar or redwood intended to gradually weather with time, all exposed wood and wood-like products (e.g. fiber-cement) shall be painted or stained. Exterior trim shall be indistinguishable from wood when painted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Not applicable.                    | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                         |
| c. Any synthetic siding and finish products shall be smooth-faced with no artificial grain texturing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Not applicable.                    | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                         |
| 4.) <b>Alternative Compliance:</b> Relief from any non-numerical standard above, and relief from any numerical standard with the exception of building height and FAR by no more than 20% of such requirement, may be granted by the Development Review Board after review and comment by the Design Advisory Board and the administrative officer. In granting such relief, the DRB shall find that:<br><br>i. the relief sought is necessary in order to accommodate unique site and/or Building circumstances or opportunities;<br><br>ii. the relief if granted is the minimum necessary to achieve the desired result;<br><br>iii. the property will otherwise be developed consistent the purpose of this ordinance, the purpose of the underlying Zoning District and this Overlay District, the purpose of the section that the relief is being sought, and all other applicable standards;<br><br>iv. the relief if granted will not impose an undue adverse burden on existing or future development of adjacent properties; and,<br><br>v. the relief if granted will yield a result equal to or better than strict compliance with the standard being relieved. |                                    | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance as approved<br><input type="checkbox"/> Not in compliance as approved<br><u>Explanation:</u> |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Applicant Compliance Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                    | Staff Compliance Confirmation                                                                               |
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| <b>3. Use</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                              |
| Mixed Use Buildings: Any new or substantially rehabilitated building over 105’ in total height shall include a mix of uses including no less than 25% of the gross leasable floor area dedicated to non-residential uses and another 25% or more dedicated to residential use.                                                                                                                                                                                                                             | See Project Narrative section 2.3, drawings A-051, A-052, and A-053 Floor Plans.<br><br>Non-Residential mixed uses are provided. <ul style="list-style-type: none"><li>• Retail: 13%</li><li>• Office: 24%</li><li>• Non-Residential Parking: 21%</li></ul> Total: <b>57%</b> Non-Residential.<br><br>Residential uses provided: <ul style="list-style-type: none"><li>• Residential: 31%</li><li>• Residential Parking: 11%</li></ul> Total: <b>42%</b> Residential. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>4. Parking</b> <i>(provided onsite)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                              |
| i. All onsite parking shall be provided in one or more of the following: <ul style="list-style-type: none"><li>a. an underground parking structure (strongly preferred);</li><li>b. an above ground parking structure separated from the public street by a liner building a minimum of 40-ft in depth; or,</li><li>c. a mixed-use building where with parking located underground, setback a minimum of 40-ft behind the façade of building at the ground level, and/or above the ground floor.</li></ul> | See Project Narrative sections 2.8, 5.3, drawings A-051, and A-052 Floor Plans.<br><br>Parking for tenants and visitors is provided at and above the second floor of the development on floors 2 through 5 of the South Tower. Parking is separated from Cherry and Bank Streets by Residential Uses. Parking is screened from view at St. Paul and Pine Streets by façade elements.                                                                                  | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| ii. All onsite parking shall participate in any Downtown Parking and Transportation Management District in order to minimize the amount of parking provided and maximize the efficiency of its utilization.                                                                                                                                                                                                                                                                                                | See Project Narrative section 5.3.                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| iii. Vehicular entrances to parking structures shall not exceed 24-ft clear width and 16-ft clear height at the street frontage.                                                                                                                                                                                                                                                                                                                                                                           | See drawings A-201 and A-202 Building Elevations.<br><br>Vehicular parking access is provided on both Cherry and Bank Streets and does not exceed 24’-0” width and 16’-0” height.                                                                                                                                                                                                                                                                                     | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| iv. At least one pedestrian route from all parking structures shall lead directly to a street frontage (i.e., not directly into a Building). When portions of a building containing parking front on more than one street, multiple pedestrian routes to street frontage is strongly encouraged.                                                                                                                                                                                                           | See Project Narrative section 2.8 and drawing A-051 Floor Plans.<br><br>Pedestrian access to parking area is provided at Cherry, Pine, and St. Paul Streets.                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |



| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                      | Applicant Compliance Documentation                                                                                                                                                                                                                                            | Staff Compliance Confirmation                                                                                                                          |
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| v. All structured parking with frontage on any portion of a public street shall be treated as follows:                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                               | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                                                                         |
| a. The required setback between the parking and the public street at the ground level must be occupied by an active use (such as, but not limited to, residential lobby, retail, office, recreational or services). This requirement shall not apply to parking located either entirely below-grade or above the second floor where parking may extend out to the building’s perimeter. | Parking is located above the second floor.                                                                                                                                                                                                                                    | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| b. All floors of a parking structure fronting a public street must be level (not inclined), and any sloped ramps between parking levels must be setback a minimum of 20-ft from the street-facing building façade and shall not be discernible along the perimeter of the parking structure.                                                                                            | See drawings A-051 and A-052 Floor Plans.<br>Parking floors are level and sloped ramps will not be discernible along the perimeter of the structure.                                                                                                                          | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| c. Where upper stories of structured parking are located at the perimeter of a building, parked vehicles, vehicle headlights and interior lighting shall be screened from view from the street and adjacent properties.                                                                                                                                                                 | See Project Narrative 2.8, drawings A-201, and A-202 Building Elevations.<br>At St. Paul and Pine Streets vehicle headlights are visually screened from view with glazed panels. Interior lighting shall be screened from view by interior valances set back from the façade. | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| d. In addition to the Urban Design Standards required above, facade treatments (materials, fenestration patterns, and architectural detailing) must be continued on stories containing parking in a manner consistent with the overall architectural design of the Building and such that levels of parking are not clearly distinguishable from other uses in a building.              | See Project Narrative 2.8, drawings A-201, and A-202 Building Elevations.<br>Parking areas are screened from public view with building façade elements consistent with the scale and materials of the overall development.                                                    | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| vi. Each parking space provided in an underground parking structure may be counted as 1.75 of the parking spaces as required in Art 8.                                                                                                                                                                                                                                                  | Not applicable.                                                                                                                                                                                                                                                               | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Applicant Compliance Documentation                  | Staff Compliance Confirmation                                                                               |
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| <b>5.     <u>Signs</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                     | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                              |
| A master sign plan pursuant to Article 7 Part 3 is required for all sites occupied by more than three tenants where all signs must meet the requirements of the master sign plan. The master sign plan must establish standards of consistency as applicable of all signs to be provided on the subject property with regard to: <ul style="list-style-type: none"><li>• Colors;</li><li>• Letter/graphics style;</li><li>• Location and Sign Type;</li><li>• Materials;</li><li>• Methods of illumination; and/or</li><li>• Maximum dimensions and proportion.</li></ul> | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| In addition to the flexibility from the requirements of Article 7 provided under Sec. 7.3.4, the following shall also be permitted when incorporated as part of a master sign plan in the DMUC Overlay:                                                                                                                                                                                                                                                                                                                                                                   |                                                     | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                              |
| i.     The area of projecting signs, marques, canopies and awnings shall not be deducted from the maximum allowed signage area permitted for signage under Sec 7.2.3.                                                                                                                                                                                                                                                                                                                                                                                                     | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| ii.    Projecting Signs: One projecting sign may be permitted for each ground floor use provided each sign:                                                                                                                                                                                                                                                                                                                                                                                                                                                               | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| a.   does not exceed 8 square feet in area;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| b.   does not project more than 4 feet from the building façade on which it is attached;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| c.   has its lowest edge at least eight (8) feet above any pedestrian way;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |



| Ordinance Requirement (summarized)                                                                                                                   | Applicant Compliance Documentation                  | Staff Compliance Confirmation                                                                                                                 |
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| d. has its highest edge no more than eighteen (18) feet above any pedestrian way; and,                                                               | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |
| e. Any encroachment into the public right-of-way must also be approved by the City Council.                                                          |                                                     | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable<br><input type="checkbox"/> Required permit condition included |
| iii. Marquee Signs: One marquee sign per street frontage may be permitted provided such sign:                                                        |                                                     | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                                                                |
| a. is associated with the following uses only: Cinema, Conference Center, Convention Center, Performing Arts Center and Recreation Facility- Indoor; | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |
| b. is located above the principal Building entrance;                                                                                                 | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |
| c. projects a minimum of 6 feet from the building façade on which it is attached but in no event more than 10 feet and 3 feet from the curb;         | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |
| d. has its lowest edge at least 9’6” above any pedestrian way;                                                                                       | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |
| e. has its highest edge no more the lesser of the floor level of the third story or 35 feet above any pedestrian way;                                | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |
| f. is no more than 40 feet in width;                                                                                                                 | See Project Narrative section 2.10. Not applicable. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                   |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                | Applicant Compliance Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Staff Compliance Confirmation                                                                                                                                              |
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| g. may contain an area for manual changeable copy that does not exceed 30 percent of the area of the sign face on which it is located or 32 square feet, whichever is less; and,                                                                                                                                                                                                                  | See Project Narrative section 2.10. Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                     |
| h. Any encroachment into the public right-of-way must also be approved by the City Council.                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable<br><input type="checkbox"/> Required permit condition included                              |
| iv. Canopies and Awnings: Where provided, awnings and canopies placed on a building facade shall meet the following specifications:                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Applicable                                                                                             |
| a. Awnings and canopies shall provide 8’ minimum clear height above the finished grade, and shall project a minimum of 6’ from the building façade to a maximum of 2’ from the curb. 14’ minimum clear height above the finished grade shall be provided above any area used for parking or circulation. Any encroachment into the public right-of-way must also be approved by the City Council. | See drawings A-201 and A-202 Building Elevations.<br><br>Awnings are located at Retail Use areas along all four streets. Due to sidewalk pitch, the height varies from 12’-0” to 28’-0”, and in no case is less than 8’-0” above sidewalk. Awnings project from façade 6’-0”.<br><br>Canopies at Main Pedestrian Entrances are typically at +/-18’-0” above sidewalk and extend +/- 11’-0” from façade, not to within 2’ of the curb.<br><br>Vehicular entrance clear heights are typically 16’-0”. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Required permit condition included<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| b. Awnings and canopies shall be placed, sized, shaped and proportioned to match the associated openings.                                                                                                                                                                                                                                                                                         | See drawings A-201 and A-202 Building Elevations.<br><br>Awnings are placed, sized, shaped, and proportioned to the associated openings.                                                                                                                                                                                                                                                                                                                                                            | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                                                |
| c. Except as provided below, awnings and canopies shall not be internally illuminated or backlit, however they may contain lighting fixtures intended to illuminate the ground beneath.                                                                                                                                                                                                           | See Project Narrative section 2.13 and L-500 Lighting/Photometric Plan.<br><br>Canopies contain lighting fixtures illuminating the ground, See FIGURE 4-I.                                                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                     |
| d. Awnings shall have a metal structure covered with non-translucent canvas, synthetic canvas or painted metal, and shall have no soffit or sides. Retractable awnings are encouraged.                                                                                                                                                                                                            | See drawings A-201 and A-202 Building Elevations.<br><br>Awnings are covered in painted metal to match panels used throughout development.                                                                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                                                |
| e. Awnings shall be rectangular in elevation and triangular in cross-section with straight edges. The valance of the awning shall be no more than 12” in height.                                                                                                                                                                                                                                  | See drawings A-201 and A-202 Building Elevations.<br><br>Awnings are rectangular in elevations, 12” in height.                                                                                                                                                                                                                                                                                                                                                                                      | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                                                |



| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Applicant Compliance Documentation                                                                                                                                                                                   | Staff Compliance Confirmation                                                                                                                          |
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| f. Canopies shall be constructed of wood and/or metal, and shall be cantilevered or supported from above. The face of the canopy shall be no more than 24” in height.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | See drawings A-201 and A-202 Building Elevations.<br><br>Canopies are constructed of steel structure with glass panels. They are cantilevered from the building structure and are <b>no more than</b> 24” in height. | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |
| g. Signage placed on an awning or canopy shall be limited to the windows and doors on the first (ground) floor, and shall not extend outside the overall length or width.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | See Project Narrative section 2.10. Not applicable.                                                                                                                                                                  | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| h. Signage placed on a canopy shall be limited to the face or may project above and may be backlit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | See Project Narrative section 2.10. Not applicable.                                                                                                                                                                  | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| i. Signage placed on an awning or canopy shall be limited to:<br><div>i. 75% of the valance or canopy face and/or 25% of the sloping plane max.<br/>ii. The height of lettering shall be limited to: 5” min - 10” max on the valance; 18” max on the sloping plane; or 24” max on or above the canopy.</div>                                                                                                                                                                                                                                                                                                                                     | See Project Narrative section 2.10. Not applicable.                                                                                                                                                                  | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u> |
| <b>6. Green Buildings and Stormwater Management</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                      |                                                                                                                                                        |
| A. <b>Green Buildings:</b> New development and substantial redevelopment in the DMUC Overlay shall be built to the standard of LEED Gold Certification, or a nationally recognized equivalent as determined by the administrative officer.                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                      |                                                                                                                                                        |
| i. At the time of application the following shall be required:<br><div>a. the submission of documentation of the planned performance criteria and elements of the project necessary to obtain the required green building certification (e.g. LEED checklist);<br/>b. documentation that the project has been registered with the applicable green building certification program (e.g. LEED project registration); and,<br/>c. a written commitment to apply for formal, written review of the project at the earliest milestone where the green building certifying body offers "precertification" or similar (e.g. LEED Design Review).</div> | See Project Narrative section 2.11 and FIGURES 2-A LEED Checklist and 2-B USGBC Registration Receipt.                                                                                                                | <input type="checkbox"/> In compliance<br><input type="checkbox"/> Not in compliance<br><u>Explanation:</u>                                            |

| Ordinance Requirement (summarized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Applicant Compliance Documentation  | Staff Compliance Confirmation                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <div>ii. Prior to the release of any Final Certificate of Occupancy the following shall be required:<div>a. the submission of revised as-built performance criteria and project elements necessary to obtain the required green building certification (e.g. LEED checklist):</div><div>b. the results of 3rd party commissioning of the building envelope and mechanical systems documenting compliance of as-built performance; and,</div><div>c. a written certification from the project design professional of record that the project has been constructed to comply with the green building requirements of this section.</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     | <div><input type="checkbox"/> Required permit condition included</div>                                                                 |
| <div>B. <b>Stormwater Management:</b> Stormwater runoff from 100% of all net new and substantially redeveloped impervious area (or an equivalent area of impervious)) must be captured and managed in such a way as to mimic pre-development (meadow in good condition, Hydrologic Soil Group B) runoff (or discharge) ratio for the 1 year, 24 hour design storm subject to review and approval by the DPW Water Resources Div.</div> <div>The feasibility of implementing runoff volume reduction practices must be evaluated in consultation with the DPW Water Resources Division and shall include an evaluation of the engineering feasibility of techniques including, but not limited to runoff reduction through stormwater reuse, green stormwater infrastructure such as green roofs, bioretention, tree planting and sewer separation of roof water for sites currently discharging to the combined sewer system. Storage and detention methods may be used to meet pre-development flow targets. When and where detention systems are the primary mode of stormwater management, “smart” precipitation integrated detention systems must be evaluated and are strongly preferred. On-site stormwater management must be maximized; however, off-site stormwater management may also be used in consultation with DPW Water Resources.</div> | See Project Narrative section 2.12. | <div><input type="checkbox"/> In compliance</div> <div><input type="checkbox"/> Not in compliance</div> <div><u>Explanation:</u></div> |



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TRAFFIC IMPACT STUDY

# Burlington Town Center Traffic Impact Study

## Burlington, Vermont

PREPARED FOR

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Devonwood Investors, LLC  
101 Cherry Street, Suite 440  
Burlington, VT 05401

PREPARED BY

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**DECEMBER 14, 2016**

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APPENDIX E: Supporting Traffic Volume Networks

APPENDIX F: Signalized Intersection Capacity Analyses

APPENDIX G: Unsignalized Intersection Capacity Analyses





## 1. Introduction

Devonwood Investors, LLC proposes to develop a multi-use project (Burlington Town Center) within the Downtown Mixed Use Core Overlay (DMUC) District on the project site presently occupied by Burlington Town Center Mall at 49 Church Street. The site is currently spread across six parcels of land, and will be reconfigured into five, two of which will be turned over to the City of Burlington for use as new public through-street extensions of Pine Street and St. Paul's Street, between Cherry and Bank Streets.

VHB has completed a Traffic Impact Study (TIS) for the proposed Burlington Town Center redevelopment which includes demolishing the existing Town Center Mall between St. Paul Street and Pine Street and constructing a mixed-use town center that includes approximately 965,352 square feet of parking, office, residential, and retail uses.

This Traffic Impact Study includes the following elements:

- A description of the existing transportation network in the vicinity of the site;
- A summary of the crash data within the study area;
- A description of the proposed development program;
- A trip generation estimate for the proposed development program;
- An evaluation of traffic operations at eighteen intersections within the study area; and
- Conclusions and recommendations to support the project.

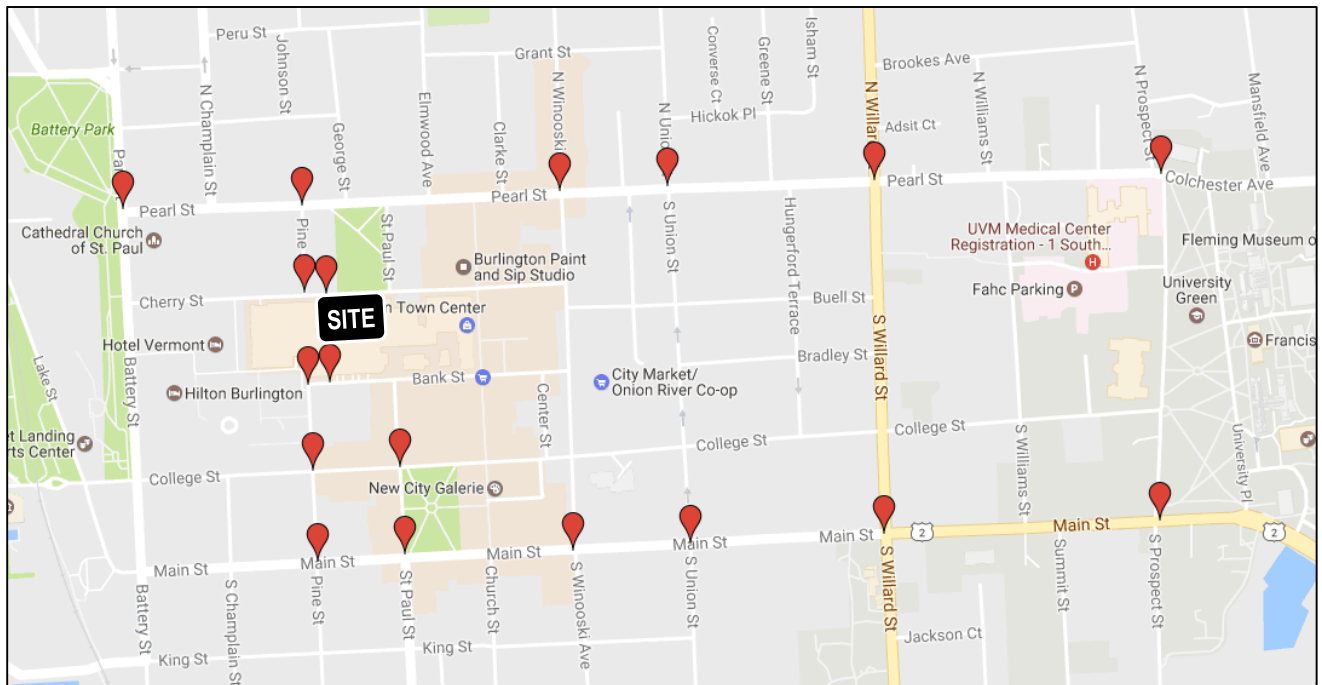
This report was developed to address the following Major Impact Review Standard, as outlined in the City of Burlington's *Comprehensive Development Ordinance* (Section 3.5.6(b)):

- *Criteria #5: The proposed development shall not cause unreasonable congestion or unsafe conditions on highways, streets, waterways, railways, bikeways, pedestrian pathways or other means of transportation, existing or proposed.*

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As part of this study, a total of 18 intersections were evaluated and summarized in regards to level of service (LOS) and delay in order to estimate how the proposed project impacts the local street network. Additional reviews and evaluations are contained within this report which summarize the existing and proposed project area as it relates to traffic and safety impacts. The general project area and traffic study intersections are shown below in **Figure 1**.

**Figure 1: Project Location and Study Intersections**



## 2. Existing Conditions

The project site is bounded by Cherry Street to the north, St. Paul Street to the east, Bank Street to the south, and Pine Street to the west. The existing Burlington Town Center Mall consists of approximately 170,000 square feet of commercial space on two floors, comprised of national, regional, and local retailers. The proposed project will involve a redevelopment of a portion of the existing mall between St. Paul Street and Pine Street, with the existing mall stores between St. Paul Street and Church Street remaining largely unchanged.

The downtown intersections being evaluated for this project were identified based on input from City staff and generally include the major intersections in the vicinity of the project which are anticipated to receive at least 75 trips during the peak hour (per VTrans *Traffic Impact Study Guidelines*). Table 1 provides a summary of the intersection control type and lane configurations at the eighteen intersections being evaluated as part of this project.

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**Table 1: Study Intersection Summary**

| Intersection                                   | Control Type                                                                        | Stop Control Approach | Approach Lane Configuration                                                                                               |
|------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------|
| 1. Cherry Street / Parking Garage              |    | Northbound            | Single lane approaches                                                                                                    |
| 2. Bank Street / Parking Garage                |    | Southbound            | Single lane approaches                                                                                                    |
| 3. Pine Street / Bank Street / Parking Garage  |    | West & Southbound     | Single lane approaches                                                                                                    |
| 4. Pine Street / Cherry Street                 |    | Southbound            | Single lane approaches                                                                                                    |
| 5. Pearl Street / Battery Street / Park Street |    |                       | EB: 1 left, 1 right<br>NB: 1 through, 2 right                                                                             |
| 6. Pearl Street / Pine Street                  |    |                       | Single lane approaches                                                                                                    |
| 7. Pearl Street / Winooski Avenue              |    |                       | EB: 1 through, 1 right<br>WB: 1 through, 1 left<br>NB: 1 left, 1 right<br>SB: 1 through, 1 through/right, 1 left          |
| 8. Pearl Street / Union Street                 |   |                       | EB: 1 through, 1 left<br>NB: 1 through/right, 1 left                                                                      |
| 9. Pearl Street / Willard Street               |  |                       | Single lane approaches                                                                                                    |
| 10. Pearl St / Prospect St / Colchester Ave    |  |                       | WB: 1 through, 1 left<br>NB: 1 through, 1 left, 1 right                                                                   |
| 11. College Street / Pine Street               |  | All-way stop          | Single lane approaches                                                                                                    |
| 12. College Street / St. Paul Street           |  | All-way stop          | Single lane approaches                                                                                                    |
| 13. Main Street / Pine Street                  |  |                       | Single lane approaches                                                                                                    |
| 14. Main Street / St. Paul Street              |  |                       | Single lane approaches                                                                                                    |
| 15. Main Street / S. Winooski Avenue           |  |                       | EB: 1 through/right, 1 left<br>WB: 1 through, 1 left, 1 right<br>SB: 1 through, 1 right, 1 left                           |
| 16. Main Street / S. Union Street              |  |                       | EB: 1 through, 1 left<br>NB: 1 through/left, 1 right                                                                      |
| 17. Main Street / S. Willard Street            |  |                       | EB: 1 through/right, 1 left<br>WB 1 through/right, 1 left                                                                 |
| 18. Main Street / S. Prospect Street           |  |                       | EB: 1 through, 1 through/right<br>WB: 1 through, 1 left, 1 right<br>NB: 1 through, 1 right<br>SB: 1 through/right, 2 left |



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### 3. Crash Summary

VTrans evaluates reported crash data and identifies High Crash Location (HCL) intersections and sections that have a minimum of five reported crashes in five years, and have an actual-to-critical ratio greater than 1.0. The actual-to-critical ratio compares the actual crash rate at a given location to a critical crash rate calculated for similar facilities statewide. A review of VTrans' most recent HCL Report (2010 – 2014)<sup>1</sup> revealed that eight intersections and two sections within the study area are HCLs. These HCLs are summarized in Table 2 below.

**Table 2: High Crash Location Intersections within Project Area**

| HCL #                | Location                      | Mile Marker   | Total Crashes | Fatalities | Injuries | Actual/<br>Critical Ratio |
|----------------------|-------------------------------|---------------|---------------|------------|----------|---------------------------|
| <b>Intersections</b> |                               |               |               |            |          |                           |
| 2                    | Main / S Winooski             | 0.990 - 1.010 | 101           | 0          | 11       | 2.73                      |
| 11                   | Main / S Willard              | 2.110 - 2.130 | 74            | 0          | 13       | 1.89                      |
| 15                   | Main / St. Paul               | 0.250 - 0.270 | 34            | 1          | 9        | 1.80                      |
| 17                   | Main / Prospect               | 0.22 - 0.24   | 73            | 0          | 18       | 1.78                      |
| 41                   | Pearl / Prospect / Colchester | 0.930 - 0.940 | 44            | 0          | 14       | 1.39                      |
| 59                   | Winooski / Pearl              | 1.310 - 1.330 | 58            | 0          | 15       | 1.29                      |
| 67                   | Pearl / Willard               | 2.420 - 2.440 | 58            | 0          | 15       | 1.81                      |
| 90                   | Pearl / Union <sup>1</sup>    | 0.000 - 0.010 | 14            | 0          | 3        | 1.10                      |
| <b>Sections</b>      |                               |               |               |            |          |                           |
| 4                    | Pearl Street <sup>2</sup>     | 0.000 - 0.300 | 104           | 0          | 5        | 4.111                     |
| 130                  | South Union <sup>3</sup>      | 0.500 - 0.800 | 32            | 0          | 8        | 1.818                     |

<sup>1</sup> Listed in HCL Report as N. Union / S. Union

<sup>2</sup> This section includes the Pearl / Battery / Park intersection as well as the Pine Street intersection.

<sup>3</sup> This section includes the intersection with Main Street.

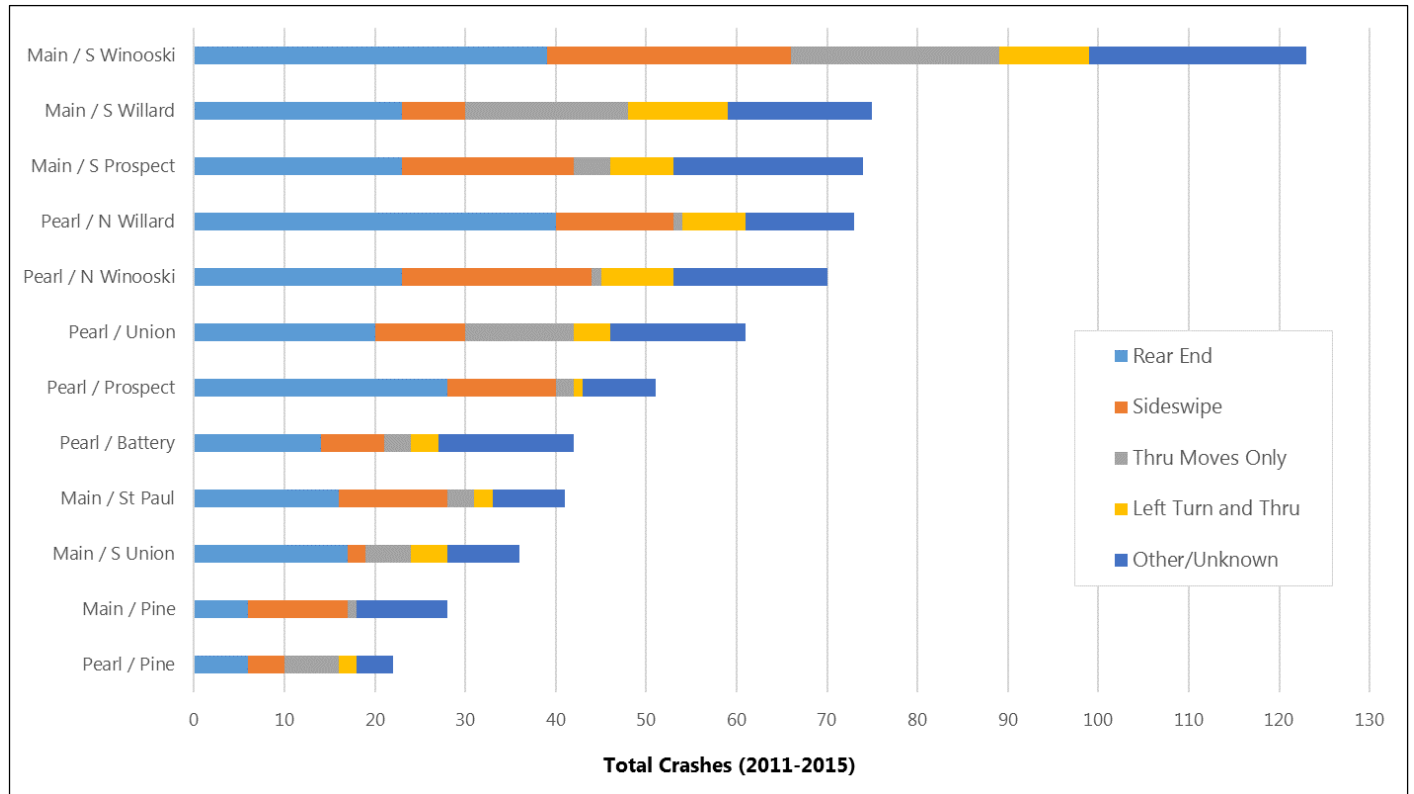
In addition to reviewing the 2010-2014 VTrans HCL report, the latest reported crash data (2011 – 2015) for the study area was reviewed via the online VTrans Public Crash Data Query Tool.<sup>2</sup> Figure 2 below summarizes reported crashes by type within 150 feet of study intersections.

<sup>1</sup> High Crash Locations Report: Intersections and Sections (2010 – 2014), Vermont Agency of Transportation, 2015.

<sup>2</sup> VTrans Public Crash Data Query Tool. <http://apps.vtrans.vermont.gov/CrashPublicQueryTool/home/index>

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**Figure 2: Study Intersection Crashes by Type**



The following are observations based on a review of reported crash data in the vicinity of the project.

- There was one fatality within the project area which occurred on December 26, 2010 at the Main Street and St. Paul Street intersection. This crash involved through movements only, during freezing precipitation, and had at least one individual under the influence of a controlled substance.
- The Main Street / Winooski Street intersection has the second highest actual/critical ratio of intersections in Vermont. Based on 2011-2015 crash data, this intersection's top crash types include rear ends (32%), sideswipes (24%), and left turn and through movements (10%).
- Across all of the study intersections, the most common crash types at these intersections are rear ends (37%) and sideswipe crashes (21%).
- Across the City, the number of reported crashes is generally consistent from month to month, with a slight increase generally in reported crashes in January and February, likely due to adverse weather conditions. Between 2011 and 2015, the number of crashes reported across Burlington has generally decreased from 1,524 reported crashes in 2011 to 1,345 crashes in 2015.

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## 4. Trip Generation

The proposed redevelopment program consists of demolishing a portion of the existing Burlington Town Center Mall between St. Paul Street and Pine Street and constructing a mixed-use town center that includes approximately 965,352 square feet of parking, office, residential, and retail uses. Primary vehicular access and egress is provided to the internal parking garage via mid-block access points on Cherry and Bank Streets. The project is located in the downtown core, surrounded by a dense network of sidewalks and bicycle facilities and directly across the street from the recently completed Green Mountain Transit Downtown Transit Center. The proposed layout of the project is shown in **Figure 3<sup>3</sup>** on the following page.

The proposed redevelopment of the Burlington Town Center includes the following general components:

- Demolition of approximately 130,000 square feet of existing retail space
- Retail – 107,304 square feet (including a market, walk-in medical clinic, restaurants and general retail)
- Preschool – 19,509 square feet
- Office space – 230,328 square feet
- Apartments – 272 units (299,602 square feet)
- Construction of Pine Street and St. Paul Street between Bank Street and Cherry Street to restore the City's street grid in this area and enhance overall connectivity downtown.

In addition, redevelopment will include replacing the existing parking garage (capacity approximately 570 spaces) with a new parking garage which is estimated to have a capacity of approximately 761 vehicles. The project will also incorporate approximately 170 bicycle parking spaces (120 long-term and 50 short-term spaces).

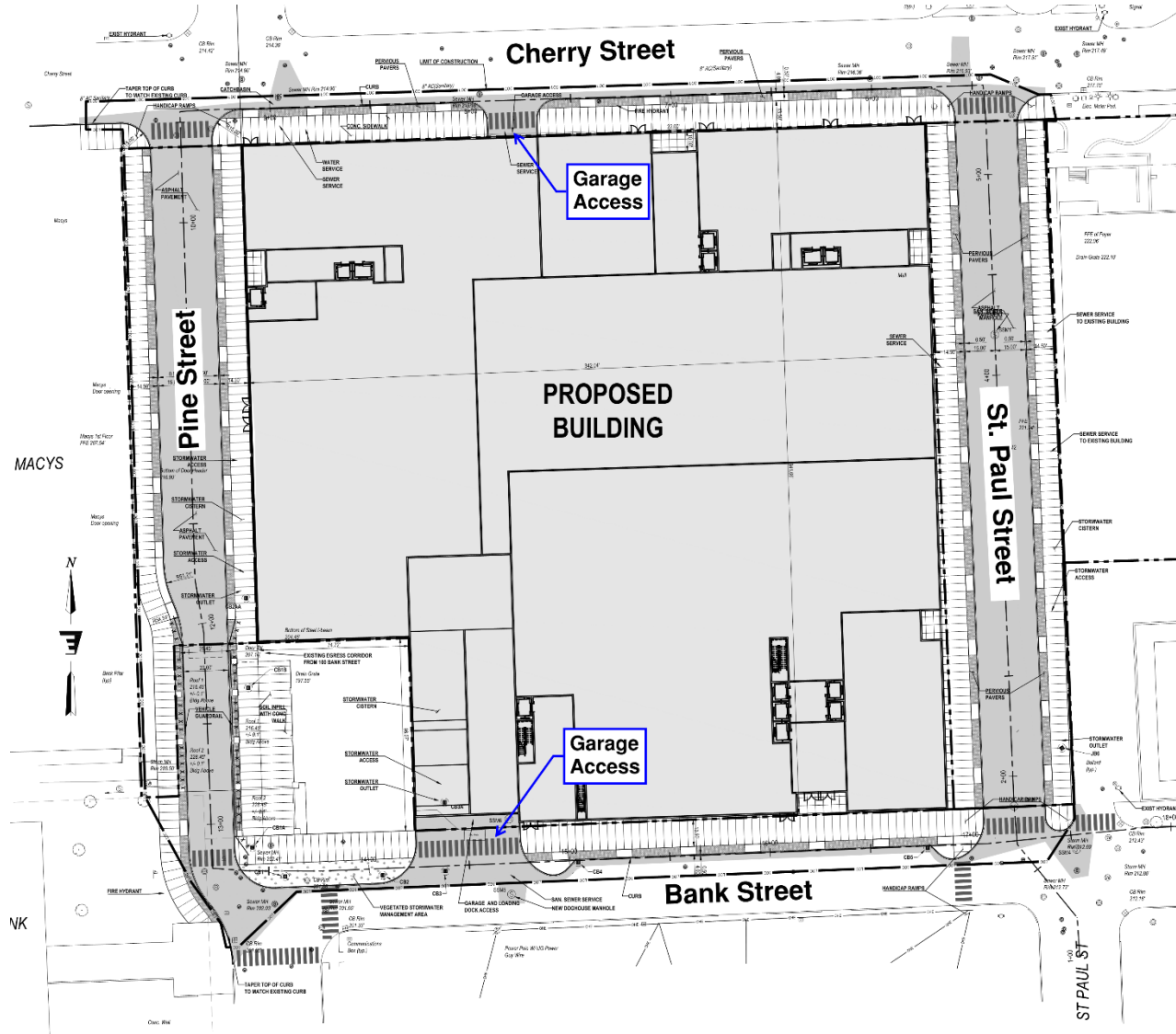
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<sup>3</sup> Site Plan developed for Devonwood Investors by Engineering Ventures, P.C., dated 12/2/2016 (Sheet C1.3).



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**Figure 3: Proposed Site Layout**



Trip generation estimates for the proposed development program were calculated using rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation*.<sup>4</sup> The land use codes assumed for this project include Mid-Rise Apartments (*Land Use Code 274*), Day Care (*Land Use Code 565*), Office (*Land Use Code 710*), and Shopping Center (*Land Use Code 820*). **Figure 4** below summarizes the trip generation estimates for the proposed development during the

<sup>4</sup> *Trip Generation Manual, 9th Edition*, Institute of Transportation Engineers, 2012.

weekday morning and weekday evening peak hours. Calculations supporting the proposed trip generation estimates are provided in the Appendix.

**Figure 4: Peak Hour Site Trip Generation Estimate**

|                        | <u>Total New Trips</u><br><i>All Modes</i><br>(a) | Transit<br>(b) | Bike &<br>Pedestrian<br>(c) | Internal<br>Capture<br>(d) | External<br>Trips<br>(e)<br>= (a) - (b) - (c) - (d) | Existing<br>Mall Trip<br>Generation<br>(f) | <u>Net New Trips</u><br><i>Vehicles</i><br>(g)<br>= (e) - (f/2) |
|------------------------|---------------------------------------------------|----------------|-----------------------------|----------------------------|-----------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------|
| <b>Weekday Morning</b> |                                                   |                |                             |                            |                                                     |                                            |                                                                 |
| Enter                  | 440                                               | 20             | 110                         | 35                         | 275                                                 | 138                                        | <b>206</b>                                                      |
| Exit                   | <u>155</u>                                        | <u>10</u>      | <u>40</u>                   | <u>10</u>                  | <u>95</u>                                           | <u>2</u>                                   | <b>94</b>                                                       |
| Total                  | 595                                               | 30             | 150                         | 45                         | 370                                                 | 140                                        | <b>300</b>                                                      |
| <b>Weekday Evening</b> |                                                   |                |                             |                            |                                                     |                                            |                                                                 |
| Enter                  | 430                                               | 20             | 110                         | 50                         | 250                                                 | 41                                         | <b>229</b>                                                      |
| Exit                   | <u>675</u>                                        | <u>35</u>      | <u>170</u>                  | <u>80</u>                  | <u>390</u>                                          | <u>159</u>                                 | <b>310</b>                                                      |
| Total                  | 1,105                                             | 55             | 280                         | 130                        | 640                                                 | 200                                        | <b>539</b>                                                      |

Given the Burlington Town Center's location in downtown Burlington, with its interconnected network of sidewalks and bicycle facilities, and the site's proximity to the new GMT Downtown Transit Center, it is reasonable to assume that a portion of the person-trips generated by the proposed project will occur by foot, by bicycle, or by bus. Further, a number of the likely Town Center tenants are active participants in the Chittenden Area Transportation Management Association (CATMA), an organization that partners with employers to reduce single occupant vehicle trips. Although no specific reduction was taken in the analysis (to remain conservative), the VTrans guidance for Transportation Demand Management (TDM) states that there is an allowable 15% reduction in single occupant vehicle trips when an office is a member of a TMA, has more than 100 employees, and operates out of a mixed-use, moderate transit development<sup>5</sup>.

The modal splits utilized in this trip generation estimate were based on US Census Journey to Work and American Community Survey Data for Burlington and incorporate a 25% bike/walk mode share and a 5% transit mode share.

Mixed use developments such as the Burlington Town Center project generate *internal capture* trips which are defined as trips having multiple destinations within a given project site (for example, a resident of the Burlington Town Center who drops off his or her child at the day care center, then picks up a coffee before departing for work would represent three individual trips, two of which were internally captured within the project site). The level of shared trips/internal capture for this project (8% of AM trips and 12% of PM trips) was determined based on information published by the Transportation Research Board (TRB) in *NCHRP Report 684*.<sup>6</sup>

Figure 4 above calculates the number of net new vehicle trips by accounting for the replacement of a portion of the trips currently generated by the Town Center Mall. The proposed project includes the demolition of approximately 75% of the existing Mall footprint (approximately

<sup>5</sup> VTrans Transportation Demand Management (TDM) Guidance – Draft 2. Vermont Agency of Transportation, Vermont, 2015.

<sup>6</sup> "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments", Transportation Research Board, Washington D.C., 2011.

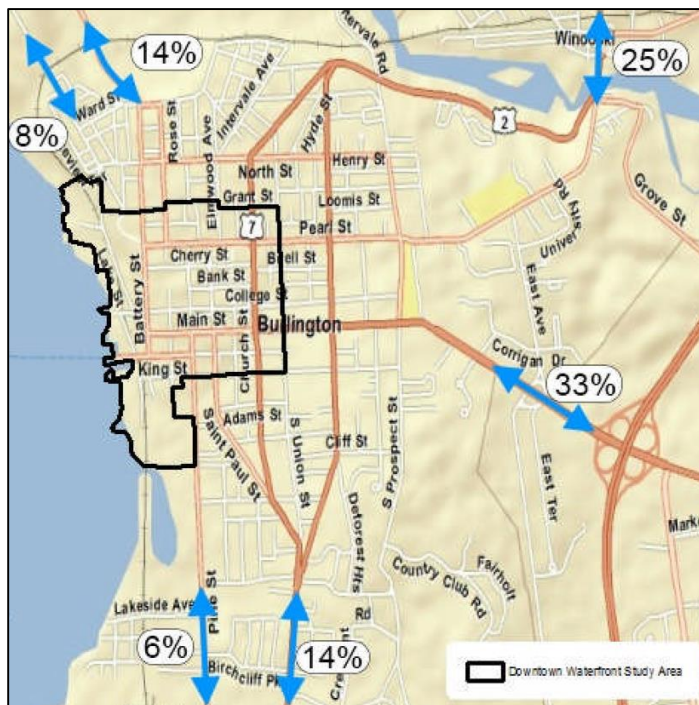
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130,000 square feet). Within the retained portion of the mall east of St. Paul Street are a number of fairly active retail uses (e.g. L.L. Bean, Starbucks). We conservatively assumed that these stores in the retained mall section will generate 50% of the trips currently occurring at the mall.

## 5. Trip Distribution

The directional distribution of site-generated traffic (after accounting for existing trips currently being generated by the Burlington Town Center) was developed based on a review of the existing travel patterns within Burlington and the surrounding area, a review of previous traffic studies, a review of US Census Journey to Work and American Community Survey Data, and trip distribution data developed through the use of the Chittenden County Regional Planning Commission's regional travel demand model as summarized within the *PlanBTV Transportation Study Final Report*<sup>7</sup> (see **Figure 5** below).

**Figure 5: Source of External Trips Destined for Downtown Burlington (source: Plan BTV Transportation Study, RSG, 2011)**



**Figure 6** shows the general distribution of net new trips generated by the Burlington Town Center across the City and at each of the major access points to downtown Burlington. At each entry point into the City, the figure shows the percentage and number of site-generated trips estimated to travel through that gateway, and the corresponding percentage increase in peak hour traffic at

<sup>7</sup> *PlanBTV Transportation Study: Final Report*, RSG, Inc., October 2011.

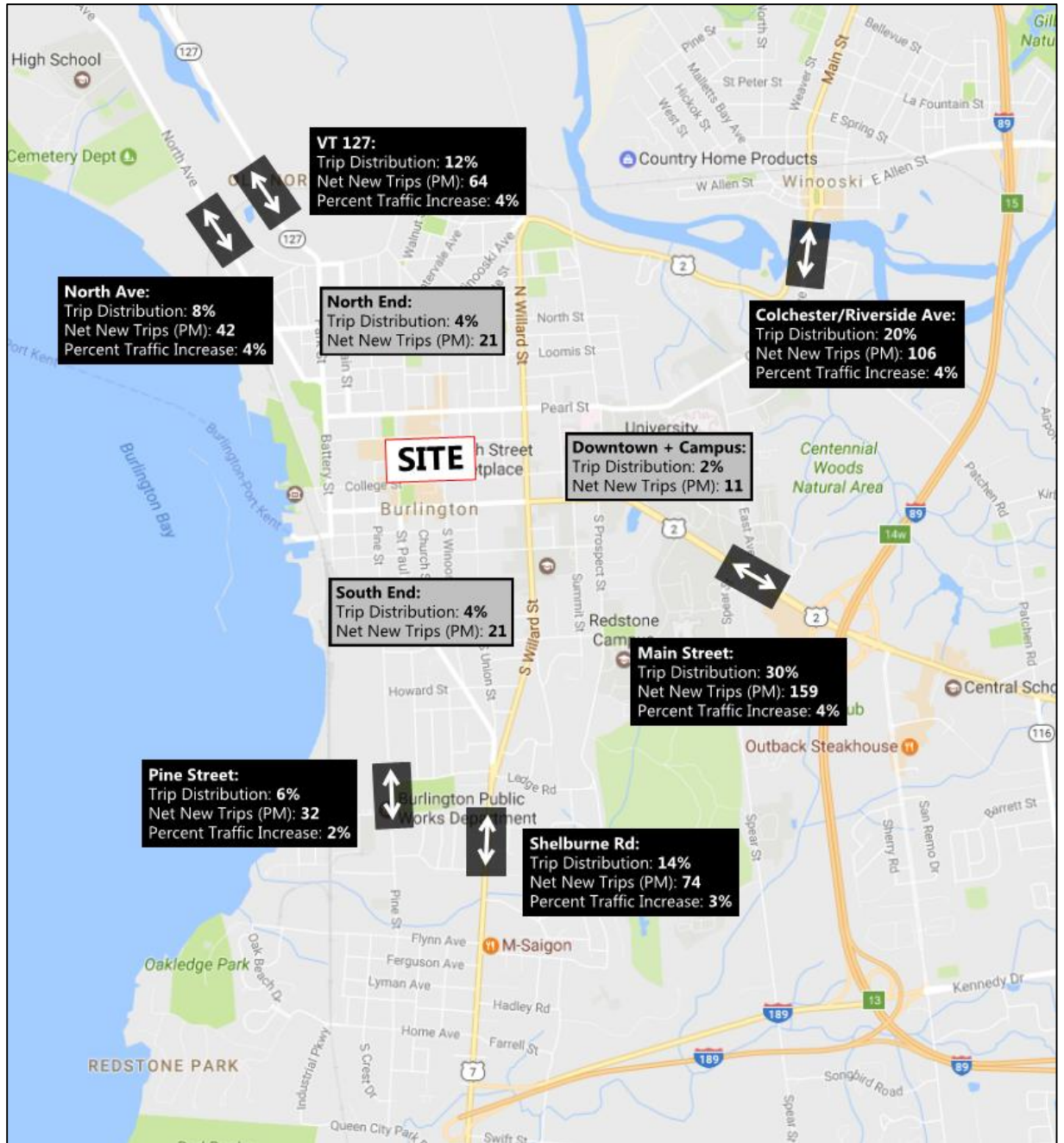


FIGURE 5-A

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that location. The graphic also breaks down the trips that remain internal to downtown Burlington between the North End, Downtown and Campus Districts, and South End.

**Figure 6: City-wide Trip Distribution Map**



**Figure 7** below shows the existing weekday evening peak hour trips at the six major gateways into downtown Burlington along with the percentage increase in trips at that gateway resulting from the project. As the figure shows, the proposed Burlington Town Center is not anticipated to increase traffic along any of the City's main gateways by more than 4% during the weekday evening peak hour.

**Figure 7: Projected Increase in PM Peak Hour Trips on Major Gateways**

| Gateway               | PM Peak Hour   |                   | % Increase |
|-----------------------|----------------|-------------------|------------|
|                       | Existing Trips | Town Center Trips |            |
| North Ave             | 1,127          | 43                | 4%         |
| Route 127             | 1,589          | 65                | 4%         |
| Colchester Ave        | 2,461          | 108               | 4%         |
| Pine St               | 1,483          | 32                | 2%         |
| Shelburne Road (US 7) | 2,563          | 76                | 3%         |
| Main St (US 2)        | 3,505          | 162               | 4%         |

A more detailed figure showing weekday AM and PM peak hour trip generation on the adjacent street network can be found in the Appendix.

## 6. Traffic Networks

The weekday morning and weekday evening peak periods were selected for analysis purposes as they represent the peak conditions for the both the site-generated traffic and the adjacent street system. Turning movement count data at the 18 study intersections was obtained from recent counts conducted by VHB and the Chittenden County Regional Planning Commission. To evaluate the impact of the proposed development within the study area, AM and PM peak hour traffic volumes were projected to the opening year (2019) and a 5-year forecast horizon (2024). Copies of the traffic volume count data are provided in the Appendix.

### 6.1 Seasonal Variation

Since it is impractical to design for the highest volume encountered during the year, VTrans guidelines recommend using the Design Hourly Volume (DHV), which generally represents the 30<sup>th</sup> highest hourly volume of the year, traffic analysis and design. Historical data from the closest, most comparable VTrans Automatic Traffic Recorder (ATR) stations in Burlington were reviewed to establish appropriate DHV adjustment factors.<sup>8</sup> Detailed calculations for the DHV adjustments are provided in the Appendix.

<sup>8</sup> ATR stations D162, D161, D096, and D155 are located on Main Street, between S Willard Street and S Prospect Street, Main Street between S Willard Street and S Union Street, Battery Street south of Pearl Street, and Pearl Street west of Prospect Street, respectively.

## 6.2 Background Growth

Traffic growth is a function of expected land development in the region. To predict a rate at which traffic can be expected to grow during the forecast period, historical traffic growth was examined. The regression analysis chart in the 2015 VTrans Redbook<sup>9</sup> for the urban street group suggests that traffic is anticipated to grow by approximately 0.5% annually. Any background growth factors were taken directly from the tables in the 2015 Redbook.

Conversations with the City of Burlington Planning Department staff revealed that there were two projects currently under consideration in the vicinity of the Town Center that should be considered in this analysis. The two developments are the Cambrian Rise project on North Avenue and a housing development on Fletcher Place, off of Colchester Avenue. Trip generation figures for the Cambrian Rise project were based on preliminary estimates prepared by RSG<sup>10</sup> and were incorporated into the background traffic volumes. The Fletcher Place housing development's trip generation was calculated using ITE trip generation rates for 75 units of single-family housing and incorporated into the background traffic volumes.

## 6.3 No Build and Build Traffic Networks

The 2019 and 2024 No Build traffic volumes were developed by applying growth factors from the VTrans regression analysis chart for urban roadways to DHV-adjusted peak hour traffic volumes. The 2019 and 2024 No Build weekday morning and weekday evening peak hour volumes are shown in **Figure 8** and **Figure 9**.

Based on the expected trip distribution methodology summarized previously, the site-generated trips were added to the 2019 and 2024 No Build peak hour traffic volumes to establish the 2019 and 2024 Build networks. The Build networks are shown in **Figure 10** and **Figure 11**.

As requested by the City's Department of Public Works, the 2024 forecast year traffic volumes were adjusted to account for the effects of the Champlain Parkway. Traffic volume projections from the *Southern Connector/Champlain Parkway MEGC-M5000(1)* study prepared by CHA were used to establish the necessary traffic volume adjustments along Main Street in the 2024 No Build and Build scenarios.<sup>11</sup>

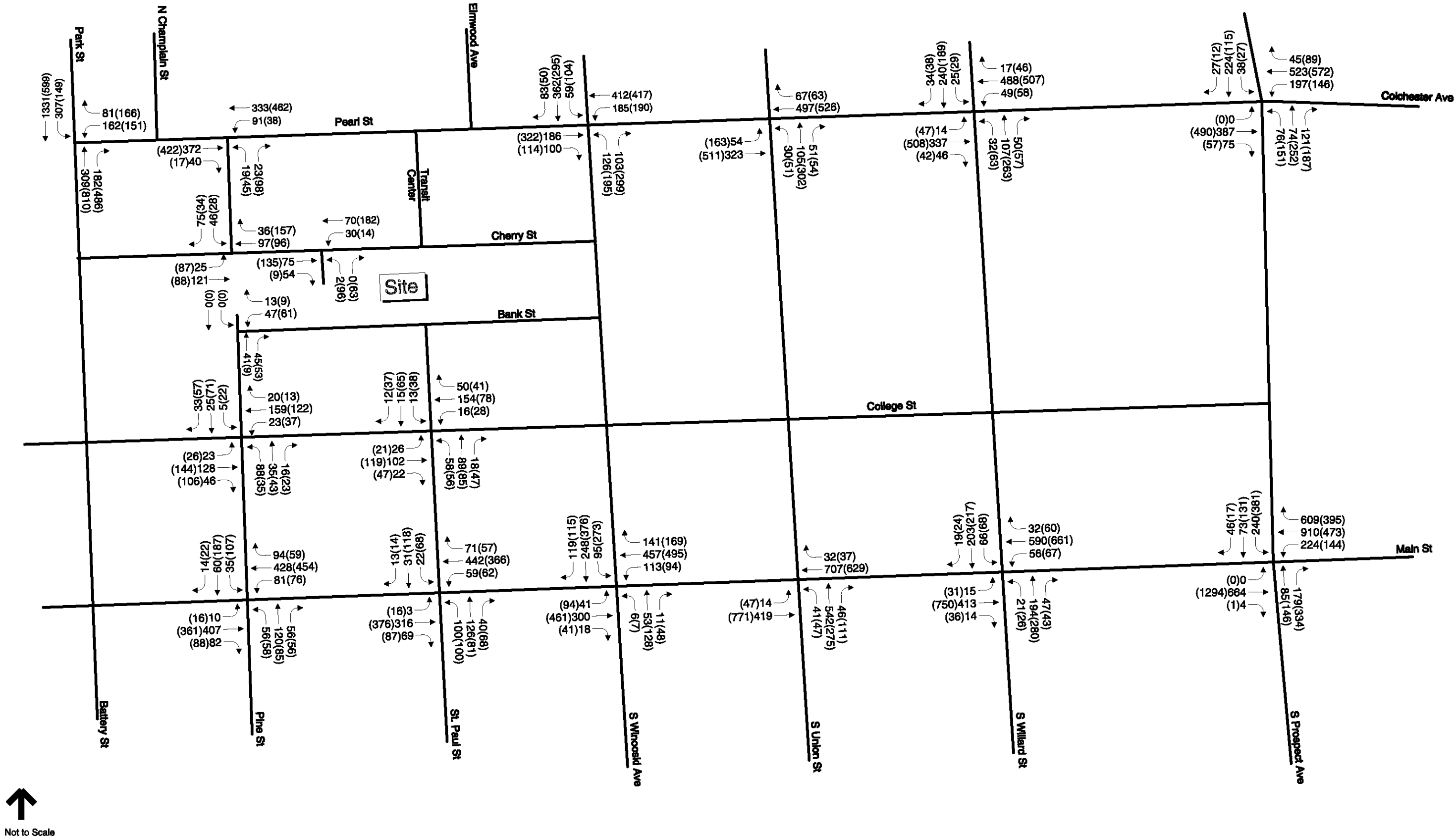
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<sup>9</sup> Continuous Traffic Counter Report (The Redbook), Vermont Agency of Transportation, 2016.

<sup>10</sup> *Cambrian Rise – 351 North Ave Preliminary Traffic Assessment: Meeting with Burlington DPW Technical Review Committee*, RSG, November 2016.

<sup>11</sup> Volumes from the 2009 Champlain Parkway Final Supplemental Environmental Impact Statement scenario, "2028 PM Peak Hour Traffic Volumes C-1 Section & C-2 Section Only" were used under the Champlain Parkway No Build and Build conditions.

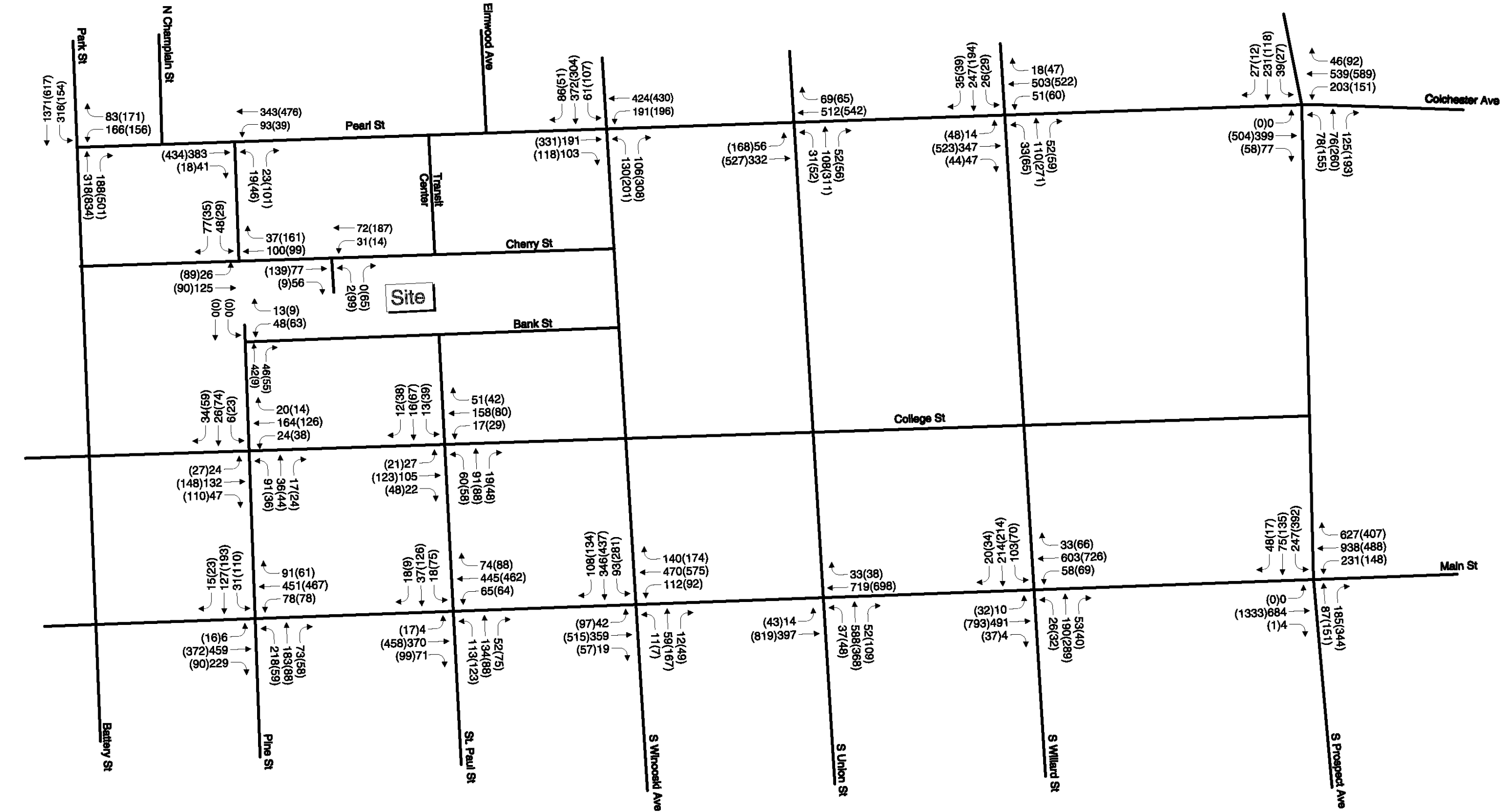




Legend  
AM Peak Hour Volume  
(PM Peak Hour Volume)



Figure 8  
2019 No Build Weekday  
Peak Hour Traffic Volumes



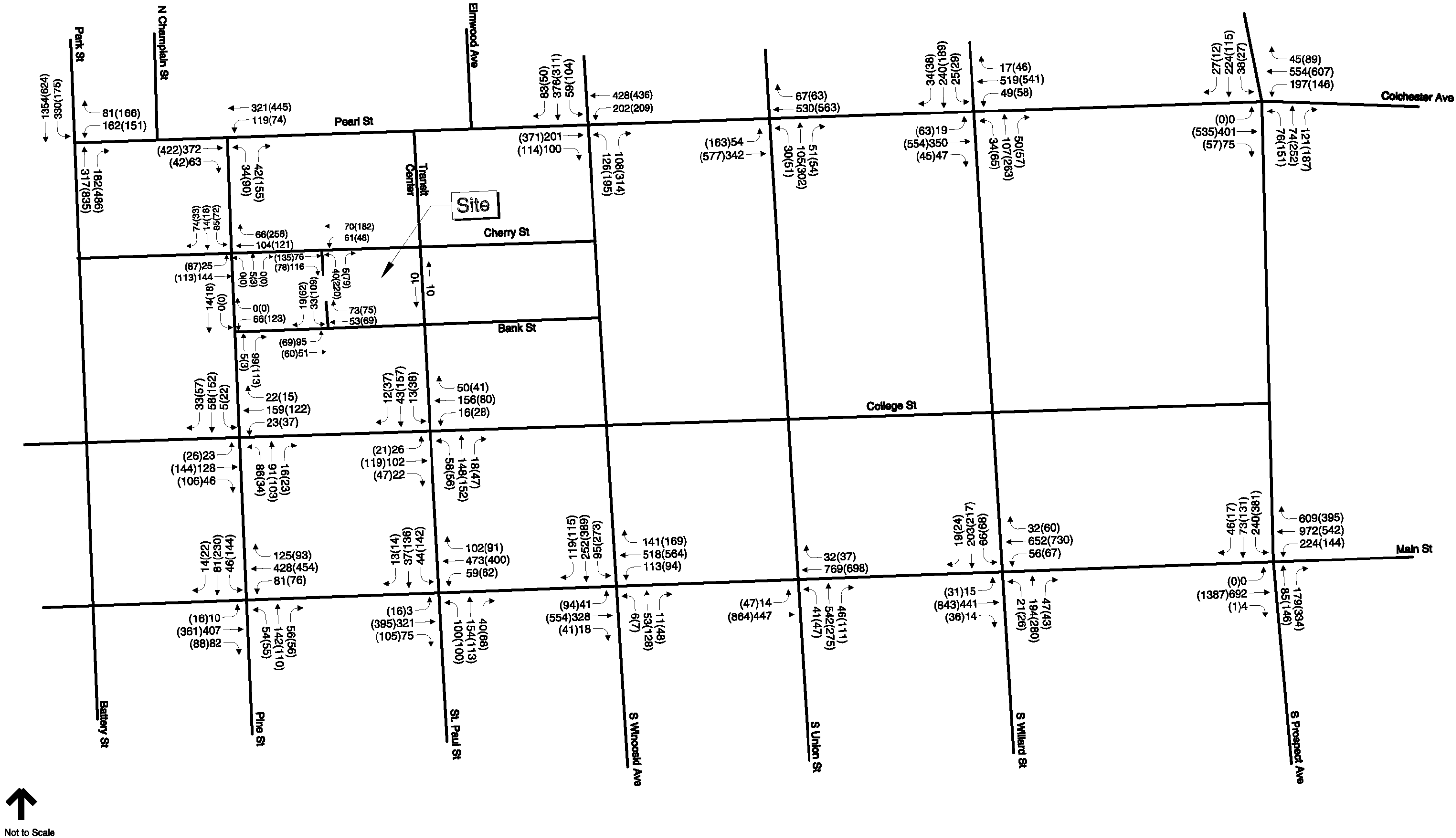
Not to Scale

Legend

AM Peak Hour Volume  
(PM Peak Hour Volume)



Figure 9  
2024 No Build Weekday  
Peak Hour Traffic Volumes  
Including Champlain Parkway



Legend  
AM Peak Hour Volume  
(PM Peak Hour Volume)

vhb  
Figure 10  
2019 Build Weekday  
Peak Hour Traffic Volumes



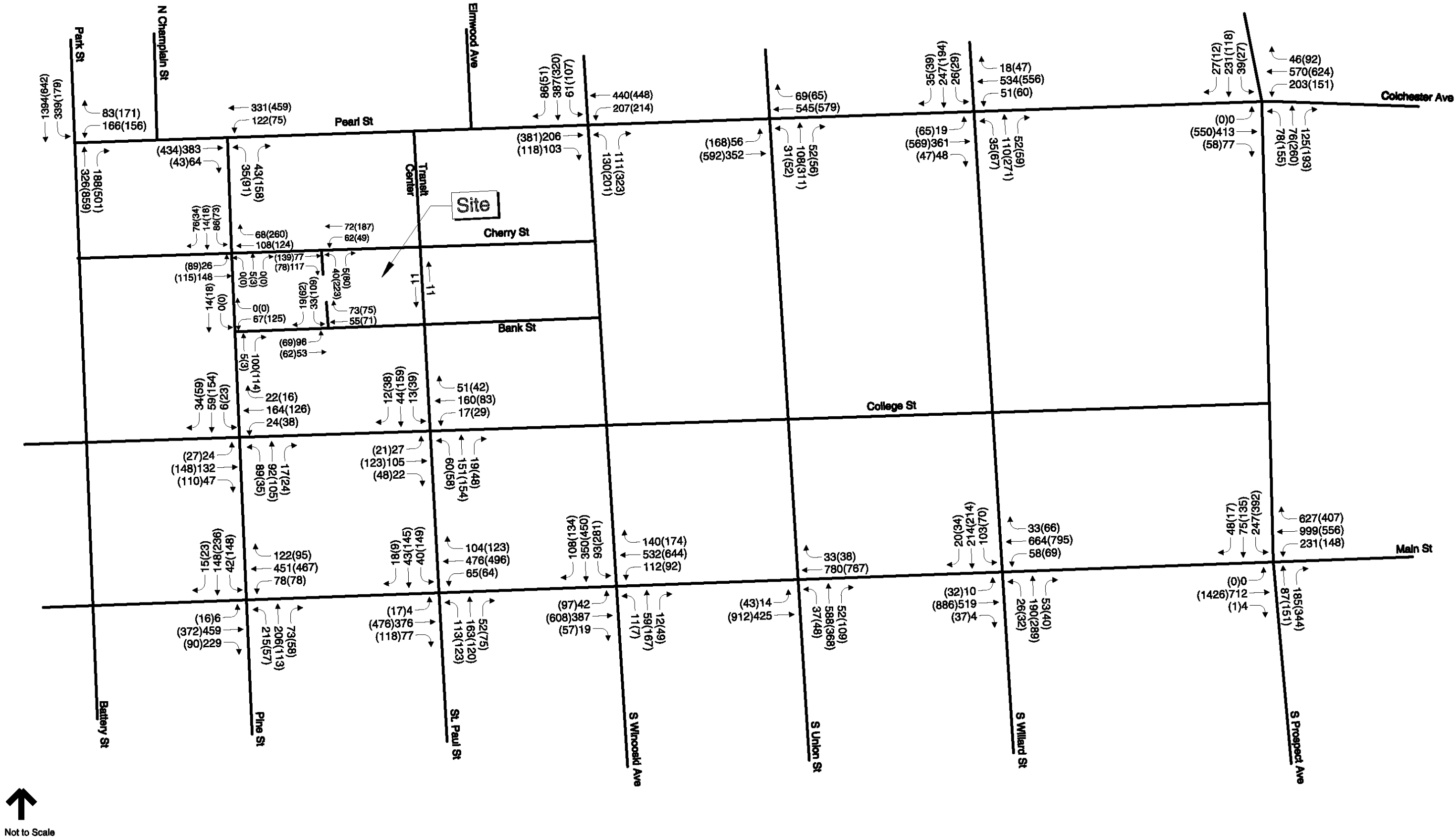


Figure 11  
2024 Build Weekday  
Peak Hour Traffic Volumes  
Including Champlain Parkway

## 7. Traffic Analyses

Intersection capacity analyses were performed for all of the study area intersections. Levels of service (LOS) were calculated based on the criteria published in the *2000 Highway Capacity Manual*.<sup>12</sup> Level of service is the term that defines the conditions that may occur on a given roadway or at an intersection when accommodating various traffic volume loads. Levels of service range from A to F with LOS A representing generally free flowing operating conditions and LOS F representing generally congested conditions. Copies of the LOS calculations are provided in the Appendix.

### 7.1 Signalized Intersections

**Table 3** and **Table 4** summarize the operational analysis at the *signalized* study area intersections during the 2019 and 2024 weekday morning and evening peak hours under No Build and Build conditions. The 2019 and 2024 Build scenarios include the new Pine Street and St. Paul Street blocks between Cherry and Bank Streets as well as new traffic control signals at the Pine Street/Bank Street and Pine Street/Cherry Street intersections.

As shown in the two tables, all of the signalized intersections were found to operate at LOS D or better in each of the No Build and Build scenarios. Volume-to-capacity ratios also remain less than 1.0 at the signalized intersections under all scenarios. On average, the trips generated by the project increase signalized intersection delay by 4-5 seconds during the peak hours.

---

<sup>12</sup> *Highway Capacity Manual*, Federal Highway Administration, Transportation Research Board, 2000.

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**Table 3: Signalized Intersection Capacity Analysis Summary – 2019**

| Intersection                           | Peak Hour  | 2019 No Build            |         |        | 2019 Build |       |     |
|----------------------------------------|------------|--------------------------|---------|--------|------------|-------|-----|
|                                        |            | v/c*                     | Delay** | LOS*** | v/c        | Delay | LOS |
| Pine St at Bank St                     | Weekday AM | UNSIGNALIZED IN NO BUILD |         |        | 0.11       | 11.9  | B   |
|                                        | Weekday PM |                          |         |        | 0.16       | 12.3  | B   |
| Pine St at Cherry St                   | Weekday AM | UNSIGNALIZED IN NO BUILD |         |        | 0.27       | 13.1  | B   |
|                                        | Weekday PM |                          |         |        | 0.38       | 14.8  | B   |
| Battery St/Park St at Pearl St         | Weekday AM | 0.78                     | 12.7    | B      | 0.83       | 15.2  | B   |
|                                        | Weekday PM | 0.69                     | 11.3    | B      | 0.71       | 12.2  | B   |
| Pine St at Pearl St                    | Weekday AM | 0.40                     | 15.4    | B      | 0.53       | 22.6  | C   |
|                                        | Weekday PM | 0.46                     | 17.3    | B      | 0.59       | 20.4  | C   |
| N/S Winooski Ave at Pearl St           | Weekday AM | 0.47                     | 10.2    | B      | 0.62       | 25.2  | C   |
|                                        | Weekday PM | 0.58                     | 13.3    | B      | 0.77       | 31.1  | C   |
| N/S Union St at Pearl St               | Weekday AM | 0.46                     | 12.4    | B      | 0.53       | 15.9  | B   |
|                                        | Weekday PM | 0.70                     | 19.2    | B      | 0.75       | 21.4  | C   |
| N/S Willard St at Pearl St             | Weekday AM | 0.55                     | 10.6    | B      | 0.61       | 16.4  | B   |
|                                        | Weekday PM | 0.75                     | 18.0    | B      | 0.85       | 23.2  | C   |
| Prospect St at Pearl St/Colchester Ave | Weekday AM | 0.71                     | 27.7    | C      | 0.83       | 36.0  | D   |
|                                        | Weekday PM | 0.82                     | 36.4    | D      | 0.86       | 41.1  | D   |
| Pine St at Main St                     | Weekday AM | 0.57                     | 13.9    | B      | 0.66       | 18.2  | B   |
|                                        | Weekday PM | 0.74                     | 18.3    | B      | 0.83       | 22.0  | C   |
| Saint Paul St at Main St               | Weekday AM | 0.52                     | 11.9    | B      | 0.64       | 15.1  | B   |
|                                        | Weekday PM | 0.50                     | 13.8    | B      | 0.57       | 14.6  | B   |
| S Winooski Ave at Main St              | Weekday AM | 0.47                     | 10.7    | B      | 0.57       | 14.0  | B   |
|                                        | Weekday PM | 0.67                     | 15.9    | B      | 0.73       | 18.1  | B   |
| S Union St at Main St                  | Weekday AM | 0.83                     | 23.7    | C      | 0.89       | 33.3  | C   |
|                                        | Weekday PM | 0.77                     | 20.6    | C      | 0.82       | 22.3  | C   |
| S Willard St at Main St                | Weekday AM | 0.62                     | 13.5    | B      | 0.71       | 18.7  | B   |
|                                        | Weekday PM | 0.81                     | 23.2    | C      | 0.86       | 26.3  | C   |
| S Prospect St at Main St               | Weekday AM | 0.78                     | 23.0    | C      | 0.93       | 29.8  | C   |
|                                        | Weekday PM | 0.93                     | 44.9    | D      | 0.97       | 50.5  | D   |

\* Volume to capacity ratio

\*\* Delay expressed in seconds per vehicle

\*\*\* Level of service



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**Table 4: Signalized Intersection Capacity Analyses Summary - 2024**

| Intersection                              | Peak Hour  | 2024 No Build            |       |     | 2024 Build |       |     |
|-------------------------------------------|------------|--------------------------|-------|-----|------------|-------|-----|
|                                           |            | v/c                      | Delay | LOS | v/c        | Delay | LOS |
| Pine St at Bank St                        | Weekday AM | UNSIGNALIZED IN NO BUILD |       |     | 0.12       | 12.0  | B   |
|                                           | Weekday PM |                          |       |     | 0.16       | 11.2  | B   |
| Pine St at Cherry St                      | Weekday AM | UNSIGNALIZED IN NO BUILD |       |     | 0.28       | 13.2  | B   |
|                                           | Weekday PM |                          |       |     | 0.39       | 15.2  | B   |
| Battery St/Park St<br>at Pearl St         | Weekday AM | 0.83                     | 15.3  | B   | 0.85       | 16.9  | B   |
|                                           | Weekday PM | 0.71                     | 12.0  | B   | 0.73       | 13.0  | B   |
| Pine St at Pearl St                       | Weekday AM | 0.47                     | 20.9  | C   | 0.54       | 22.4  | C   |
|                                           | Weekday PM | 0.47                     | 16.1  | B   | 0.61       | 19.5  | B   |
| N/S Winooski Ave<br>at Pearl St           | Weekday AM | 0.52                     | 12.3  | B   | 0.64       | 26.8  | C   |
|                                           | Weekday PM | 0.60                     | 13.2  | B   | 0.79       | 32.0  | C   |
| N/S Union St at<br>Pearl St               | Weekday AM | 0.52                     | 15.7  | B   | 0.54       | 15.3  | B   |
|                                           | Weekday PM | 0.75                     | 20.8  | C   | 0.79       | 22.9  | C   |
| N/S Willard St at<br>Pearl St             | Weekday AM | 0.64                     | 13.3  | B   | 0.63       | 17.0  | B   |
|                                           | Weekday PM | 0.77                     | 19.1  | B   | 0.89       | 26.5  | C   |
| Prospect St at Pearl<br>St/Colchester Ave | Weekday AM | 0.82                     | 39.6  | D   | 0.84       | 42.8  | D   |
|                                           | Weekday PM | 0.85                     | 38.4  | D   | 0.89       | 44.4  | D   |
| Pine St at Main St                        | Weekday AM | 0.87                     | 29.8  | C   | 0.92       | 30.7  | C   |
|                                           | Weekday PM | 0.76                     | 19.0  | B   | 0.86       | 23.3  | C   |
| Saint Paul St at<br>Main St               | Weekday AM | 0.61                     | 15.0  | B   | 0.65       | 15.2  | B   |
|                                           | Weekday PM | 0.62                     | 15.4  | B   | 0.67       | 16.5  | B   |
| S Winooski Ave at<br>Main St              | Weekday AM | 0.61                     | 13.5  | B   | 0.65       | 14.9  | B   |
|                                           | Weekday PM | 0.71                     | 18.4  | B   | 0.82       | 21.1  | C   |
| S Union St at<br>Main St                  | Weekday AM | 0.89                     | 33.3  | C   | 0.92       | 37.0  | D   |
|                                           | Weekday PM | 0.86                     | 25.0  | C   | 0.88       | 26.5  | C   |
| S Willard St at<br>Main St                | Weekday AM | 0.74                     | 19.1  | B   | 0.78       | 20.2  | C   |
|                                           | Weekday PM | 0.86                     | 27.7  | C   | 0.88       | 30.6  | C   |
| S Prospect St at<br>Main St               | Weekday AM | 0.91                     | 29.0  | C   | 0.96       | 31.7  | C   |
|                                           | Weekday PM | 0.93                     | 46.3  | D   | 0.97       | 51.1  | D   |

## 7.2 Unsignalized Intersections

**Table 5** and **Table 6** summarize the operational analysis at the *unsignalized* study area intersections during the 2019 and 2024 weekday morning and evening peak hours under No Build and Build conditions.

As shown in the two tables, all unsignalized intersection approaches are anticipated to operate at LOS of C or better and none of the unsignalized approaches exceed a v/c ratio of 0.51.

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**Table 5: Unsignalized Intersection Capacity Analyses Summary - Weekday AM Peak Hour**

| Intersection / Movement             | 2019 AM No Build                      |       |     | 2019 AM Build                  |       |     | 2024 AM No Build                      |       |     | 2024 AM Build                  |       |     |
|-------------------------------------|---------------------------------------|-------|-----|--------------------------------|-------|-----|---------------------------------------|-------|-----|--------------------------------|-------|-----|
|                                     | v/c                                   | Delay | LOS | v/c                            | Delay | LOS | v/c                                   | Delay | LOS | v/c                            | Delay | LOS |
| Cherry Street at Parking Garage     |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from Cherry St         | 0.08                                  | 0     | -   | 0.11                           | 0     | -   | 0.08                                  | 0     | -   | 0.11                           | 0     | -   |
| WB movements from Cherry St         | 0.02                                  | 2.4   | A   | 0.04                           | 3.7   | A   | 0.02                                  | 2.4   | A   | 0.04                           | 3.7   | A   |
| NB movements from Garage            | 0                                     | 10    | B   | 0.07                           | 10.7  | B   | 0                                     | 9.9   | A   | 0.07                           | 10.7  | B   |
| Bank St at Pine St/(Parking Garage) |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| WB movements from Bank St           | 0.07                                  | 9.1   | A   | SIGNALIZED IN BUILD CONDITIONS |       |     | 0.06                                  | 9     | A   | SIGNALIZED IN BUILD CONDITIONS |       |     |
| NB movements from Pine St           | 0.06                                  | 0     | -   |                                |       |     | 0.05                                  | 0     | -   |                                |       |     |
| SB movements from Garage            | 0                                     | 0     | -   |                                |       |     | 0                                     | 0     | -   |                                |       |     |
| Bank St at Parking Garage           |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from Bank St           | DOES NOT EXIST IN NO BUILD CONDITIONS |       |     | 0.06                           | 5.1   | A   | DOES NOT EXIST IN NO BUILD CONDITIONS |       |     | 0.06                           | 5.1   | A   |
| WB movements from Bank St           |                                       |       |     | 0.07                           | 0     | -   |                                       |       |     | 0.07                           | 0     | -   |
| SB movements from Garage            |                                       |       |     | 0.08                           | 10.4  | B   |                                       |       |     | 0.08                           | 10.5  | B   |
| Cherry St at Pine St                |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from Cherry St         | 0.02                                  | 1.4   | A   | SIGNALIZED IN BUILD CONDITIONS |       |     | 0.02                                  | 1.4   | A   | SIGNALIZED IN BUILD CONDITIONS |       |     |
| WB movements from Cherry St         | 0.08                                  | 0     | -   |                                |       |     | 0.08                                  | 0     | -   |                                |       |     |
| NB movements from Pine St           | --                                    | --    | --  |                                |       |     | --                                    | --    | --  |                                |       |     |
| SB movements from Pine St           | 0.15                                  | 10.2  | B   |                                |       |     | 0.15                                  | 10.2  | B   |                                |       |     |
| College St at Pine St               |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from College St        | 0.28                                  | 9.3   | A   | 0.29                           | 9.6   | A   | 0.28                                  | 9.3   | A   | 0.30                           | 9.8   | A   |
| WB movements from College St        | 0.29                                  | 9.4   | A   | 0.30                           | 9.8   | A   | 0.29                                  | 9.4   | A   | 0.31                           | 10    | A   |
| NB movements from Pine St           | 0.22                                  | 9.3   | A   | 0.30                           | 10    | B   | 0.22                                  | 9.3   | A   | 0.31                           | 10.2  | B   |
| SB movements from Pine St           | 0.10                                  | 8.3   | A   | 0.15                           | 8.8   | A   | 0.10                                  | 8.3   | A   | 0.16                           | 8.9   | A   |
| College St at St. Paul St           |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from College St        | 0.22                                  | 8.9   | A   | 0.22                           | 9.2   | A   | 0.22                                  | 8.9   | A   | 0.23                           | 9.3   | A   |
| WB movements from College St        | 0.30                                  | 9.4   | A   | 0.32                           | 9.8   | A   | 0.30                                  | 9.4   | A   | 0.33                           | 9.9   | A   |
| NB movements from St. Paul St       | 0.25                                  | 9.4   | A   | 0.33                           | 10.2  | B   | 0.25                                  | 9.4   | A   | 0.34                           | 10.3  | B   |
| SB movements from St. Paul St       | 0.06                                  | 8.3   | A   | 0.11                           | 8.7   | A   | 0.06                                  | 8.3   | A   | 0.12                           | 8.8   | A   |



Table 6: Unsignalized Intersection Capacity Analyses Summary - PM Weekday Peak Hour

| Intersection / Movement             | 2019 PM No Build                      |       |     | 2019 PM Build                  |       |     | 2024 PM No Build                      |       |     | 2024 PM Build                  |       |     |
|-------------------------------------|---------------------------------------|-------|-----|--------------------------------|-------|-----|---------------------------------------|-------|-----|--------------------------------|-------|-----|
|                                     | v/c                                   | Delay | LOS | v/c                            | Delay | LOS | v/c                                   | Delay | LOS | v/c                            | Delay | LOS |
| Cherry Street at Parking Garage     |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from Cherry St         | 0.08                                  | 0     | -   | 0.13                           | 0     | -   | 0.09                                  | 0     | -   | 0.13                           | 0     | -   |
| WB movements from Cherry St         | 0.01                                  | 0.6   | A   | 0.04                           | 1.9   | A   | 0.01                                  | 0.6   | A   | 0.04                           | 1.9   | A   |
| NB movements from Garage            | 0.22                                  | 11.3  | B   | 0.5                            | 16.8  | C   | 0.23                                  | 11.5  | B   | 0.51                           | 17.2  | C   |
| Bank St at Pine St/(Parking Garage) |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| WB movements from Bank St           | 0.07                                  | 8.9   | A   | SIGNALIZED IN BUILD CONDITIONS |       |     | 0.07                                  | 9     | A   | SIGNALIZED IN BUILD CONDITIONS |       |     |
| NB movements from Pine St           | 0.04                                  | 0     | -   |                                |       |     | 0.04                                  | 0     | -   |                                |       |     |
| SB movements from Garage            | 0                                     | 0     | -   |                                |       |     | 0                                     | 0     | -   |                                |       |     |
| Bank St at Parking Garage           |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from Bank St           | DOES NOT EXIST IN NO BUILD CONDITIONS |       |     | 0.05                           | 4.3   | A   | DOES NOT EXIST IN NO BUILD CONDITIONS |       |     | 0.05                           | 4.3   | A   |
| WB movements from Bank St           |                                       |       |     | 0.09                           | 0     | -   |                                       |       |     | 0.09                           | 0     | -   |
| SB movements from Garage            |                                       |       |     | 0.23                           | 11.4  | B   |                                       |       |     | 0.23                           | 11.4  | B   |
| Cherry St at Pine St                |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from Cherry St         | 0.07                                  | 4.2   | A   | SIGNALIZED IN BUILD CONDITIONS |       |     | 0.07                                  | 4.2   | A   | SIGNALIZED IN BUILD CONDITIONS |       |     |
| WB movements from Cherry St         | 0.15                                  | 0     | -   |                                |       |     | 0.15                                  | 0     | -   |                                |       |     |
| NB movements from Pine St           | --                                    | --    | --  |                                |       |     | --                                    | --    | --  |                                |       |     |
| SB movements from Pine St           | 0.09                                  | 10.6  | B   |                                |       |     | 0.09                                  | 10.7  | B   |                                |       |     |
| College St at Pine St               |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from College St        | 0.38                                  | 10.1  | B   | 0.42                           | 11.3  | B   | 0.39                                  | 10.3  | B   | 0.44                           | 11.7  | B   |
| WB movements from College St        | 0.25                                  | 9.5   | A   | 0.29                           | 10.4  | B   | 0.27                                  | 9.6   | A   | 0.30                           | 10.6  | B   |
| NB movements from Pine St           | 0.16                                  | 9.1   | A   | 0.28                           | 10.3  | B   | 0.17                                  | 9.2   | A   | 0.29                           | 10.5  | B   |
| SB movements from Pine St           | 0.23                                  | 9.3   | A   | 0.37                           | 11    | B   | 0.24                                  | 9.4   | A   | 0.38                           | 11.2  | B   |
| College St at St. Paul St           |                                       |       |     |                                |       |     |                                       |       |     |                                |       |     |
| EB movements from College St        | 0.27                                  | 9.5   | A   | 0.31                           | 10.4  | B   | 0.28                                  | 9.6   | A   | 0.32                           | 10.6  | B   |
| WB movements from College St        | 0.22                                  | 9.1   | A   | 0.25                           | 10    | B   | 0.23                                  | 9.2   | A   | 0.26                           | 10.2  | B   |
| NB movements from St. Paul St       | 0.27                                  | 9.5   | A   | 0.40                           | 11.2  | B   | 0.29                                  | 9.7   | A   | 0.41                           | 11.4  | B   |
| SB movements from St. Paul St       | 0.21                                  | 9.1   | A   | 0.36                           | 10.8  | B   | 0.22                                  | 9.2   | A   | 0.37                           | 11    | B   |

## 8. Conclusions

The proposed redevelopment of the Burlington Town Center includes the following general components:

- Demolition of approximately 130,000 square feet of existing retail space
- Retail – 107,304 square feet (including a market, walk-in medical clinic, restaurants and general retail)
- Preschool – 19,509 square feet
- Office space – 230,328 square feet
- Apartments – 272 units (299,602 square feet)
- Construction of Pine Street and St. Paul Street between Bank Street and Cherry Street to restore the City's street grid in this area and enhance overall connectivity downtown.

The trip generation estimates conducted for this study indicate that the proposed redevelopment program will generate approximately 300 net new vehicle trips (206 entering and 94 exiting) during the weekday morning peak hour and 539 net new vehicle trips (229 entering and 310 exiting) during the weekday evening peak hour. The site-generated trips were distributed onto the downtown street network based on a review of the existing travel patterns, a review of previous traffic studies, a review of US Census Journey to Work and American Community Survey Data, and trip distribution data developed through the use of the CCRPC regional travel demand model.

From a traffic operations perspective, all of the signalized intersections were found to operate at LOS D or better in each of the No Build and Build. Volume-to-capacity ratios at the signalized intersections also remain less than 1.0 under all scenarios. On average, the trips generated by the project increase signalized intersection delay by 4-5 seconds during the peak hours. Further, it was determined that the site generated trips did not increase traffic volumes on any of the main arterials into Burlington by more than 4% over current peak hour volumes.

As demonstrated in this report, the City of Burlington's existing grid street network, transit facilities, sidewalk network, and bicycle facilities adequately accommodate the additional trips generated by the Town Center. Several important aspects of the project contribute to this overall accommodation of site-generated trips including:

- The project is located in the downtown core of Burlington, surrounded by a dense network of sidewalks and bicycle amenities and directly across the street from the recently completed Green Mountain Transit Downtown Transit Center. The proximity and availability of these amenities will result in a significant number of site-generated trips occurring by non-automobile mode (e.g. by foot, by bicycle, and by bus).
- A number of the likely Town Center tenants are active participants in the Chittenden Area Transportation Management Association (CATMA), an organization that partners with employers and employees to reduce single occupant vehicle trips.

- The density and mix of uses proposed for the project will likely result in a number of trips occurring entirely *within* the Town Center (e.g. apartment to daycare or office to restaurant), and thus not impacting the adjacent street network.
- An important aspect of the project is the proposed construction of Pine Street and St. Paul Street between Bank Street and Cherry Street to restore the City's street grid in this area. In addition to improving overall downtown connectivity, the new blocks of Pine Street and St. Paul Street will enhance bus accessibility from the Downtown Transit Center and create new routes for existing cross-town trips, thereby reducing overall delay on parallel north-south streets including Battery Street and South Winooski Avenue.
- New traffic signals are proposed at the Pine Street/Cherry Street, Pine Street/Bank Street, and St. Paul Street/Cherry Street (integrated with Downtown Transit signals) which will accommodate both site-generated trips, newly re-routed cross-town trips, and buses departing from the Downtown Transit Center.
- The City's traffic impact fees generated by the project can be used to further optimize traffic signals and enhance corridor signal coordination plans.

In conclusion, based on the results of this Traffic Impact Study, the Burlington Town Center project is not expected to generate unreasonable congestion or unsafe conditions within Burlington's transportation system.



# Technical Appendix Traffic



- 
- Traffic Volume Data
  - Crash Data
  - Adjustment Factors (Seasonal / DHV and Growth)
  - Trip Generation Calculations
  - Supporting Traffic Volume Networks
  - Signalized Intersection Capacity Analyses
  - Unsignalized Intersection Capacity Analyses



# Traffic Volume Data

FIGURE 5-A



# Computations - Traffic Volumes

**Project:** BTV Town Center **Project #:** 57881.00  
**Location:** Burlington, VT **Sheet:** \_\_\_\_\_  
**Calculated by:** E. Quallen **Date:** 11/28/16  
**Checked by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Title:** \_\_\_\_\_  
**Intersection:** \_\_\_\_\_

Intersection: Cherry St / Parking Garage  
 Count Date(s): 6/14/2016

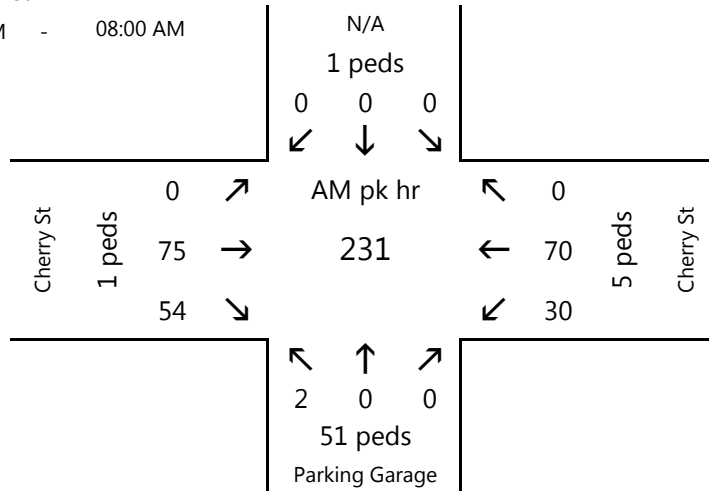
Town: Burlington  
 Counter: VHB

## Peak Hour Volumes

|          | SB  |      |    |     | WB        |      |    |     | NB             |      |    |     | EB        |      |    |     | Total |
|----------|-----|------|----|-----|-----------|------|----|-----|----------------|------|----|-----|-----------|------|----|-----|-------|
|          | N/A |      |    |     | Cherry St |      |    |     | Parking Garage |      |    |     | Cherry St |      |    |     |       |
|          | RT  | Thru | LT | Ped | RT        | Thru | LT | Ped | RT             | Thru | LT | Ped | RT        | Thru | LT | Ped |       |
| AM pk hr | 0   | 0    | 0  | 1   | 0         | 70   | 30 | 5   | 0              | 0    | 2  | 51  | 54        | 75   | 0  | 1   | 231   |
| PM pk hr | 0   | 0    | 0  | 0   | 0         | 182  | 14 | 1   | 63             | 0    | 96 | 73  | 9         | 135  | 0  | 4   | 499   |

## AM Peak Hour

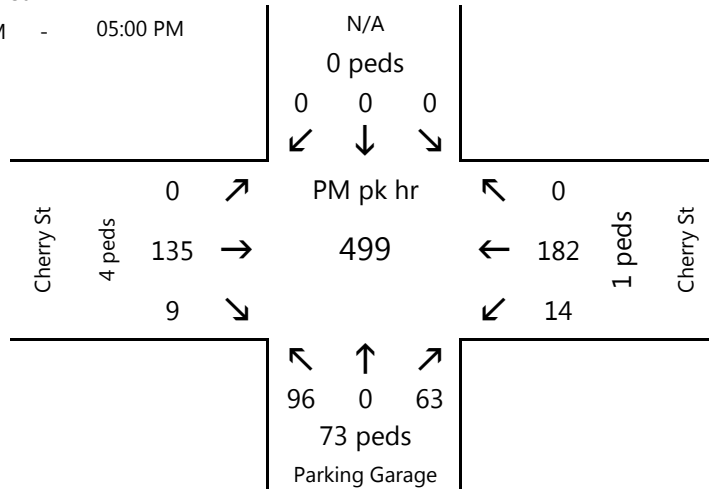
07:00 AM - 08:00 AM



% Auto: 79.9%  
 % Med: 0.0%  
 % Heavy: 0.0%  
 total % Trucks: 0.0%

## PM Peak Hour

04:00 PM - 05:00 PM



% Auto: 86.5%  
 % Med: 0.0%  
 % Heavy: 0.0%  
 total % Trucks: 0.0%



FIGURE 5-A



# Computations - Traffic Volumes

**Project:** BTV Town Center **Project #:** 57881.00  
**Location:** Burlington, VT **Sheet:** \_\_\_\_\_  
**Calculated by:** E. Quallen **Date:** 11/28/16  
**Checked by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Title:** \_\_\_\_\_  
**Intersection:** \_\_\_\_\_

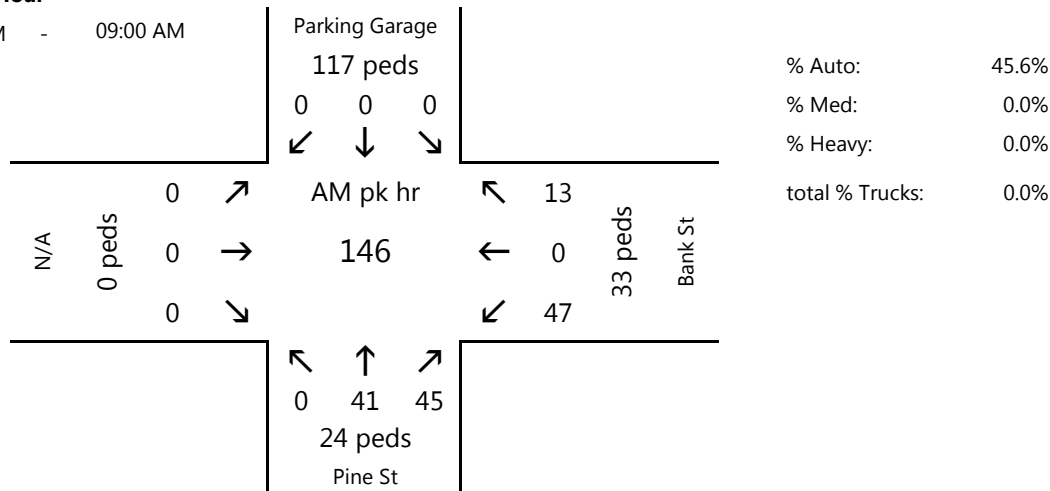
Intersection: Bank St / Pine St/Parking Garage **Town:** Burlington  
 Count Date(s): 6/14/2016 **Counter:** VHB

## Peak Hour Volumes

|          | SB             |      |    |     | WB      |      |    |     | NB      |      |    |     | EB  |      |    |     | Total |
|----------|----------------|------|----|-----|---------|------|----|-----|---------|------|----|-----|-----|------|----|-----|-------|
|          | Parking Garage |      |    |     | Bank St |      |    |     | Pine St |      |    |     | N/A |      |    |     |       |
|          | RT             | Thru | LT | Ped | RT      | Thru | LT | Ped | RT      | Thru | LT | Ped | RT  | Thru | LT | Ped |       |
| AM pk hr | 0              | 0    | 0  | 117 | 13      | 0    | 47 | 33  | 45      | 41   | 0  | 24  | 0   | 0    | 0  | 0   | 146   |
| PM pk hr | 0              | 0    | 0  | 102 | 9       | 1    | 61 | 61  | 53      | 9    | 0  | 35  | 0   | 0    | 0  | 0   | 133   |

## AM Peak Hour

08:00 AM - 09:00 AM



## PM Peak Hour

05:00 PM - 06:00 PM

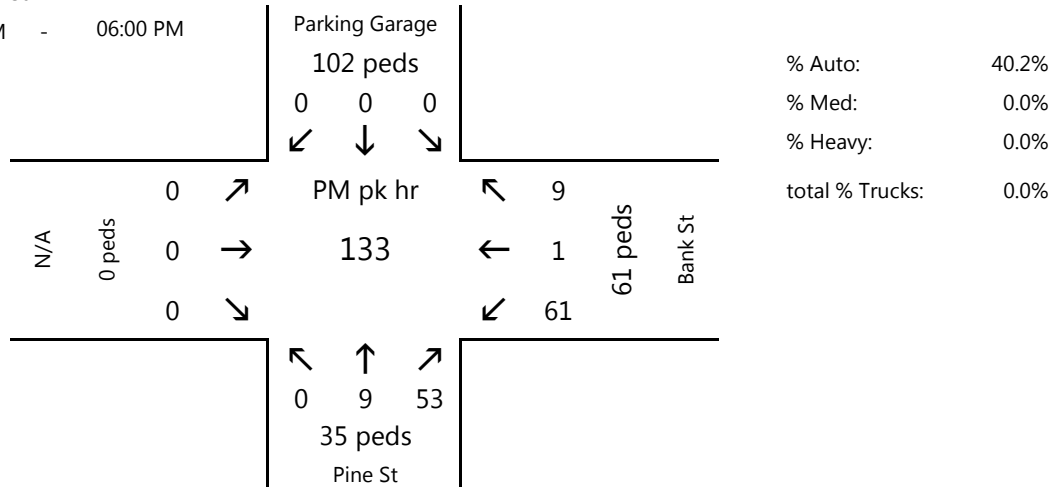


FIGURE 5-A



# Computations - Traffic Volumes

Project: BTV Town Center Project #: 57881.00  
 Location: Burlington, VT Sheet: \_\_\_\_\_  
 Calculated by: E. Quallen Date: 12/2/16  
 Checked by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Title: BTV Town Center Traffic Counts  
 Intersection: Pine St / Cherry St

Intersection: Pine St / Cherry St  
 Count Date(s): 12/2/2016 (AM) 11/30/2016 (PM)

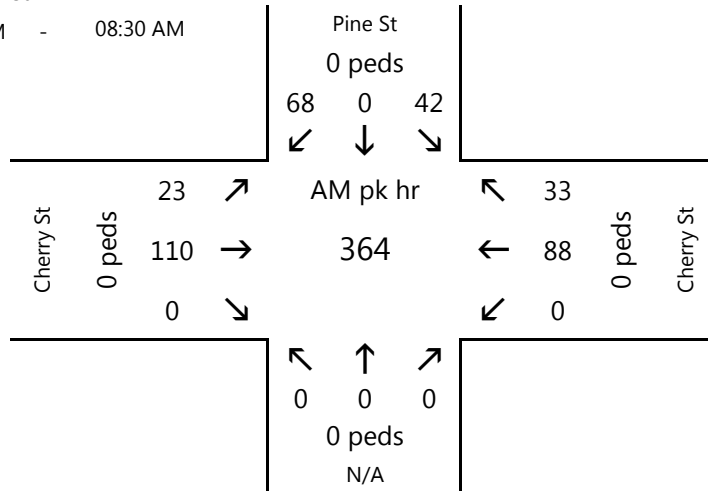
Town: Burlington  
 Counter: VHB

## Peak Hour Volumes

|          | SB      |      |    |     | WB        |      |    |     | NB  |      |    |     | EB        |      |    |     | Total |
|----------|---------|------|----|-----|-----------|------|----|-----|-----|------|----|-----|-----------|------|----|-----|-------|
|          | Pine St |      |    |     | Cherry St |      |    |     | N/A |      |    |     | Cherry St |      |    |     |       |
|          | RT      | Thru | LT | Ped | RT        | Thru | LT | Ped | RT  | Thru | LT | Ped | RT        | Thru | LT | Ped |       |
| AM pk hr | 68      | 0    | 42 | 0   | 33        | 88   | 0  | 0   | 0   | 0    | 0  | 0   | 0         | 110  | 23 | 0   | 364   |
| PM pk hr | 31      | 0    | 26 | 29  | 143       | 88   | 0  | 9   | 0   | 0    | 0  | 0   | 0         | 80   | 79 | 33  | 447   |

## AM Peak Hour

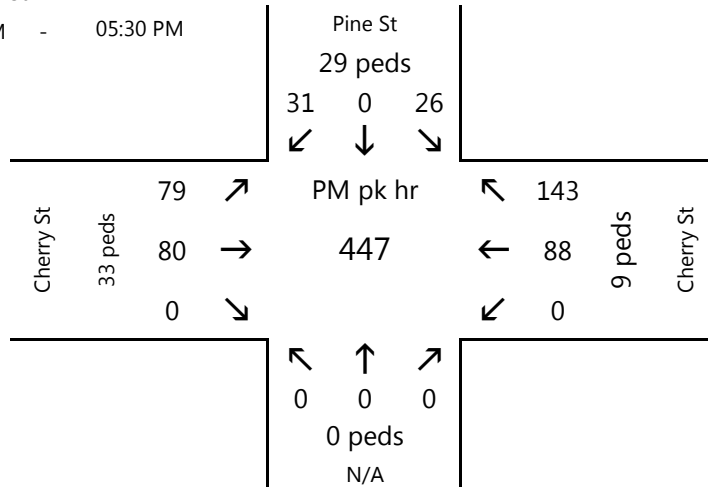
07:30 AM - 08:30 AM



% Auto: 95.9%  
 % Med: 4.1%  
 % Heavy: 0.0%  
 total % Trucks: 4.1%

## PM Peak Hour

04:30 PM - 05:30 PM



% Auto: 82.4%  
 % Med: 3.9%  
 % Heavy: 0.0%  
 total % Trucks: 3.9%

FIGURE 5-A

### Peak Hour Data for Intersection

**Int ID:** 30403224  
**Community:** BURLINGTON  
**Road 1:** BATTERY ST  
**Road 2:** PEARL ST

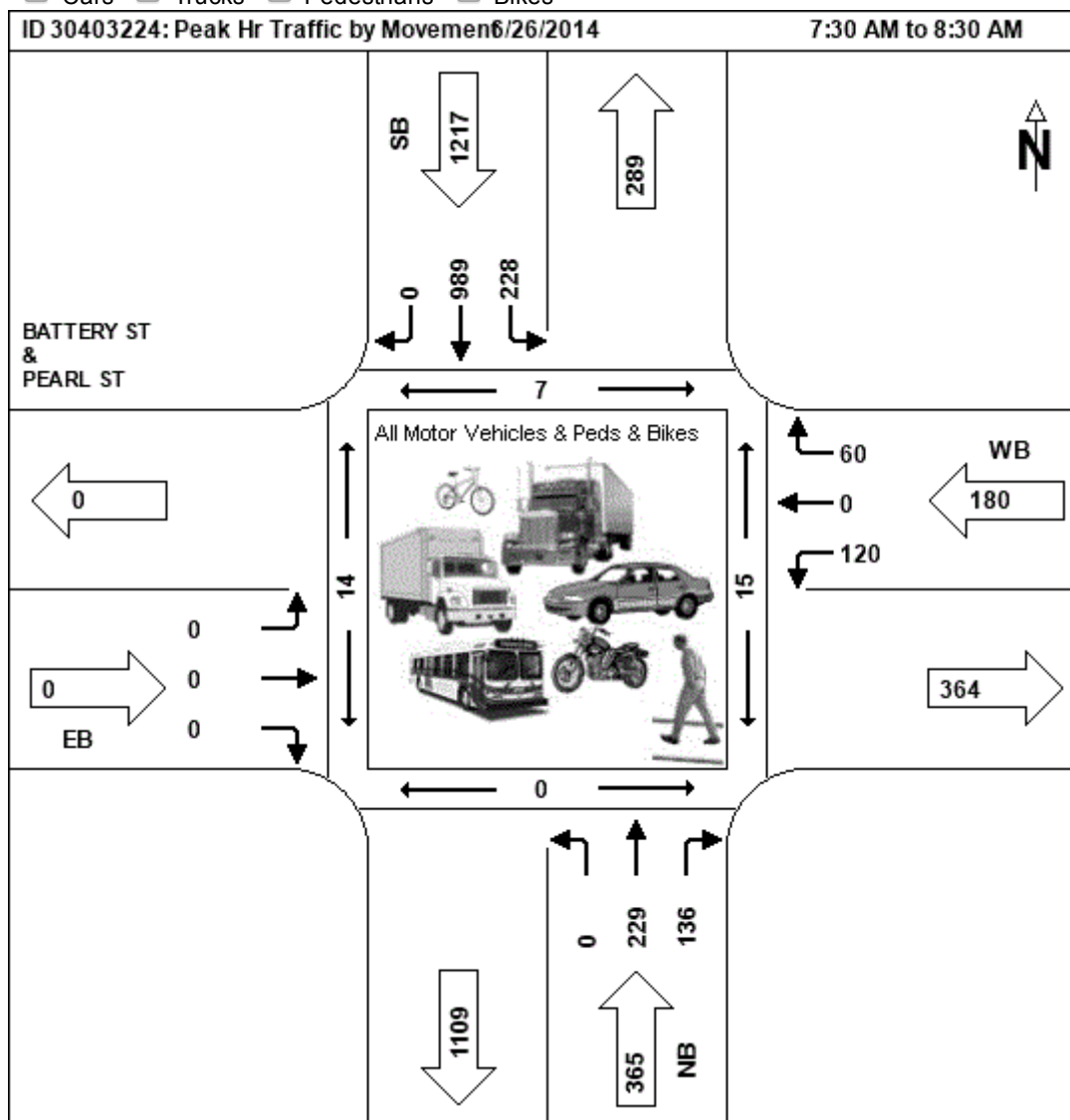
**Corridor:**  
**Road 3:** BATTERY ST  
**Road 4:**

1-1 of 1

**AM Peak Hour**  
**06/26/2014**

| NB         |           |      |       |     |           | SB        |      |       |     |           |           | WB   |       |     |           |           |  |
|------------|-----------|------|-------|-----|-----------|-----------|------|-------|-----|-----------|-----------|------|-------|-----|-----------|-----------|--|
| Start Time | Left      | Thru | Right | Ped | App Total | Left      | Thru | Right | Ped | App Total | Left      | Thru | Right | Ped | App Total | Int Total |  |
| 7:30 AM    | 0         | 61   | 38    | 2   | 99        | 48        | 249  | 0     | 3   | 297       | 23        | 0    | 10    | 2   | 33        | 429       |  |
| 7:45 AM    | 0         | 75   | 39    | 3   | 114       | 65        | 252  | 0     | 1   | 317       | 32        | 0    | 28    | 0   | 60        | 491       |  |
| 8:00 AM    | 0         | 42   | 34    | 6   | 76        | 54        | 237  | 0     | 5   | 291       | 32        | 0    | 6     | 3   | 38        | 405       |  |
| 8:15 AM    | 0         | 51   | 25    | 4   | 76        | 61        | 251  | 0     | 5   | 312       | 33        | 0    | 16    | 2   | 49        | 437       |  |
| Total      | 0         | 229  | 136   | 15  | 365       | 228       | 989  | 0     | 14  | 1217      | 120       | 0    | 60    | 7   | 180       | 1762      |  |
| PHF        | 0.76 0.87 |      |       |     | 0.80      | 0.88 0.98 |      |       |     | 0.96      | 0.91 0.54 |      |       |     | 0.75      |           |  |
| HV %       | 11        | 10   |       |     | 2         | 3         |      |       |     | 10        | 13        |      |       |     |           |           |  |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**Midday Peak Hour**  
**06/26/2014**

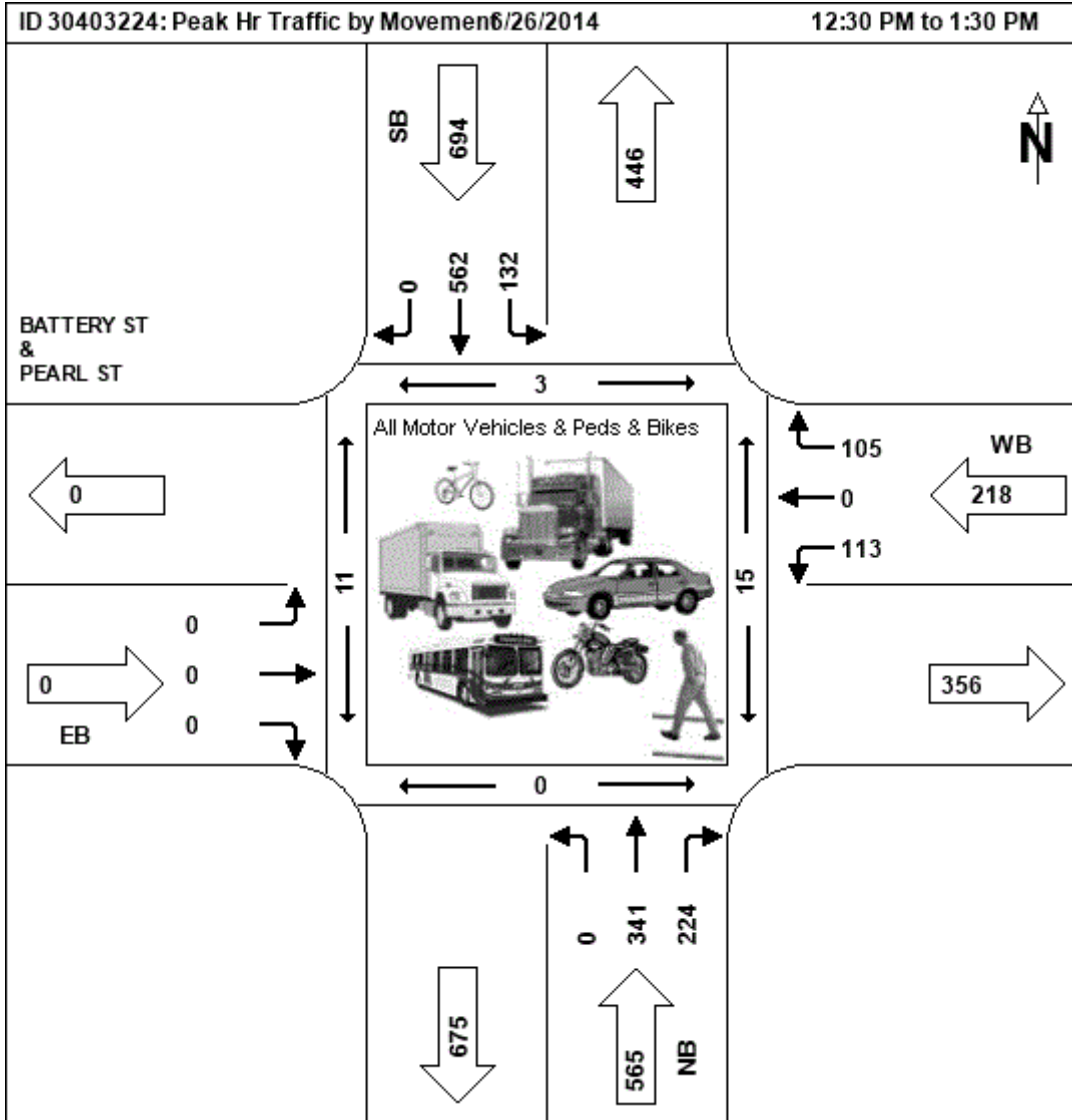
06/26/2017

| NB         |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 12:30 PM   | 0    | 81   | 46    | 6   | 127       | 39   | 143  | 0     | 4   | 182       | 22   | 0    | 26    | 0   | 48        | 357       |



|          |   |      |      |    |      |      |      |   |    |      |      |   |      |      |
|----------|---|------|------|----|------|------|------|---|----|------|------|---|------|------|
| 12:45 PM | 0 | 78   | 58   | 2  | 136  | 35   | 155  | 0 | 0  | 190  | 33   | 0 | 3    | 395  |
| 1:00 PM  | 0 | 98   | 53   | 5  | 151  | 26   | 135  | 0 | 1  | 161  | 24   | 0 | 16   | 352  |
| 1:15 PM  | 0 | 84   | 67   | 2  | 151  | 32   | 129  | 0 | 6  | 161  | 34   | 0 | 27   | 373  |
| Total    | 0 | 341  | 224  | 15 | 565  | 132  | 562  | 0 | 11 | 694  | 113  | 0 | 105  | 218  |
| PHF      |   | 0.87 | 0.84 |    | 0.94 | 0.85 | 0.91 |   |    | 0.91 | 0.83 |   | 0.73 | 0.79 |
| HV %     |   | 3    | 3    |    | 2    | 4    |      |   |    | 6    | 5    |   |      |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/26/2014**

| NB         |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |      |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped  |
| 4:30 PM    | 0    | 131  | 94    | 1   | 225       | 27   | 100  | 0     | 3   | 127       | 33   | 0    | 25    | 1    |
| 4:45 PM    | 0    | 158  | 79    | 1   | 237       | 23   | 119  | 0     | 0   | 142       | 27   | 0    | 28    | 0    |
| 5:00 PM    | 0    | 150  | 120   | 2   | 270       | 31   | 107  | 0     | 0   | 138       | 25   | 0    | 30    | 1    |
| 5:15 PM    | 0    | 139  | 80    | 0   | 219       | 33   | 109  | 0     | 3   | 142       | 26   | 0    | 39    | 1    |
| Total      | 0    | 578  | 373   | 4   | 951       | 114  | 435  | 0     | 6   | 549       | 111  | 0    | 122   | 3    |
| PHF        |      | 0.91 | 0.78  |     | 0.88      | 0.86 | 0.91 |       |     | 0.97      | 0.84 |      | 0.78  | 0.90 |
| HV %       |      | 2    | 3     |     | 4         | 1    |      |       |     | 1         | 2    |      |       |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

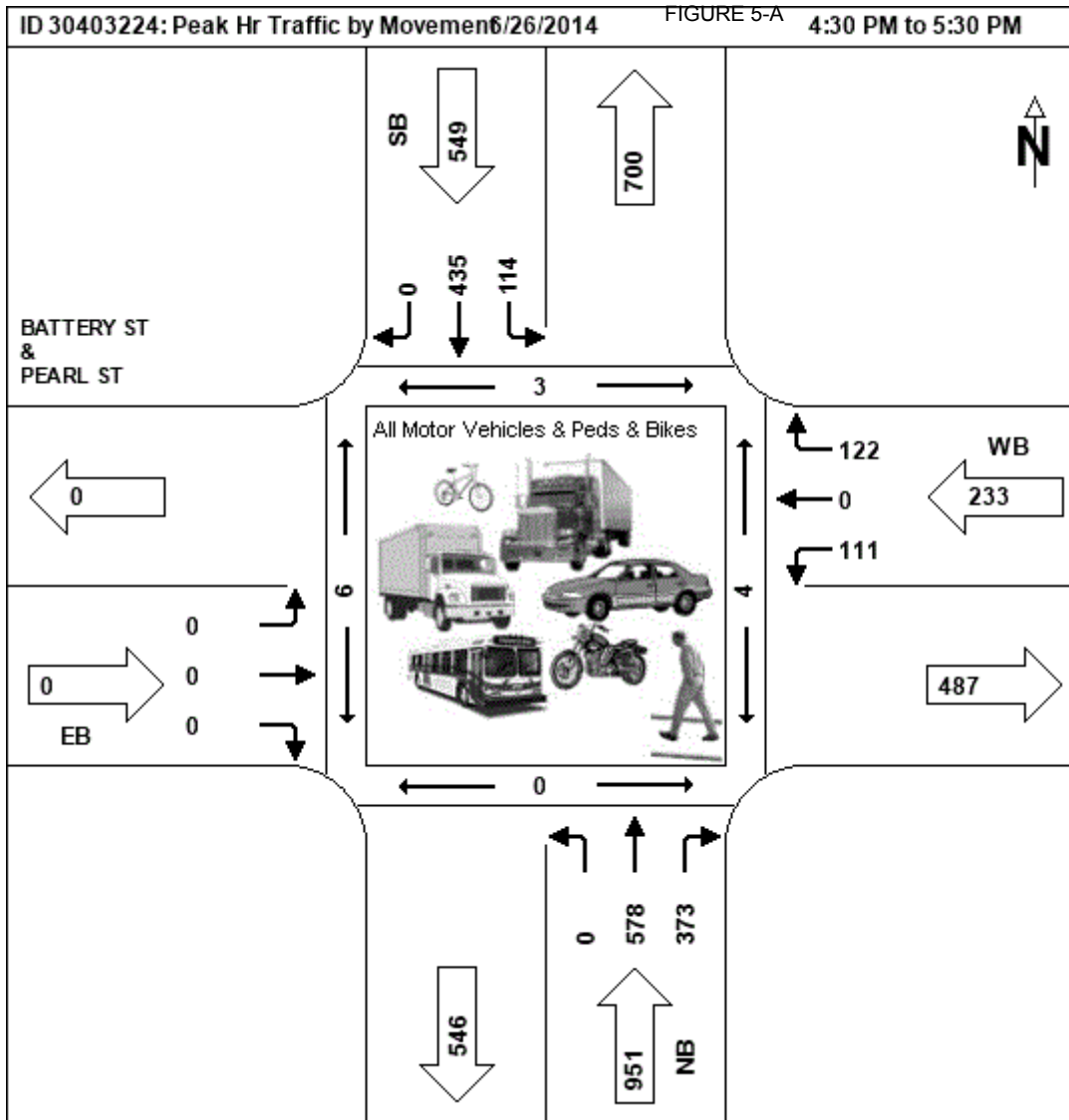


FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403221  
 Community: BURLINGTON  
 Road 1: PEARL ST  
 Road 2: PINE ST

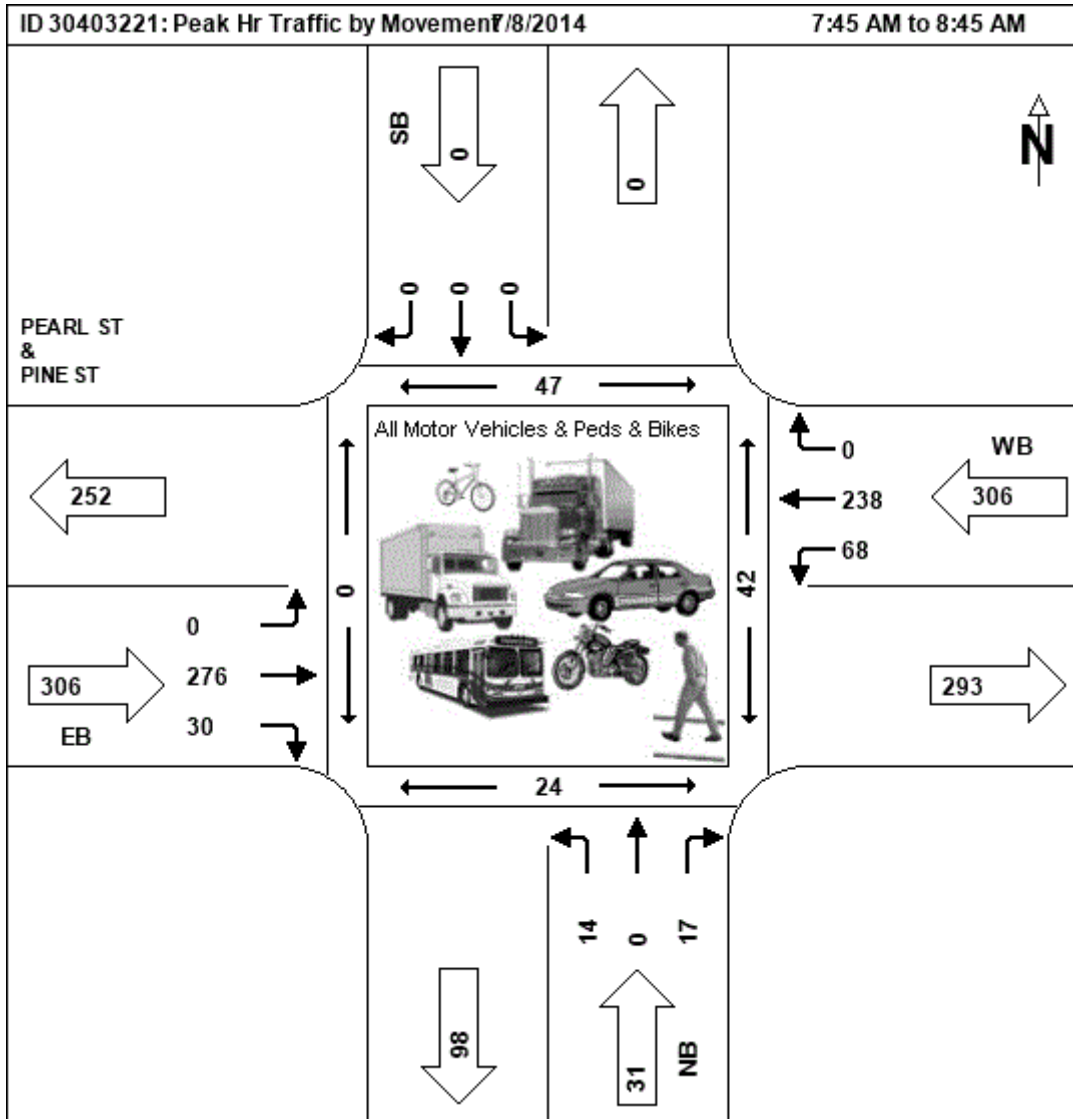
Corridor:  
 Road 3: PEARL ST  
 Road 4:

|<<| < |> |>>| 1-1 of 1

**AM Peak Hour**  
**07/08/2014**

| NB      |      |      |       |     | EB    |      |      |       |     | WB    |      |      |       |     | App   | Int   |
|---------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|-------|
| Start   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Int   |
| Time    |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total | Total |
| 7:45 AM | 4    | 0    | 4     | 10  | 8     | 0    | 79   | 10    | 5   | 89    | 16   | 50   | 0     | 14  | 66    | 163   |
| 8:00 AM | 3    | 0    | 6     | 14  | 9     | 0    | 57   | 4     | 10  | 61    | 20   | 62   | 0     | 9   | 82    | 152   |
| 8:15 AM | 4    | 0    | 4     | 9   | 8     | 0    | 67   | 9     | 4   | 76    | 14   | 67   | 0     | 13  | 81    | 165   |
| 8:30 AM | 3    | 0    | 3     | 9   | 6     | 0    | 73   | 7     | 5   | 80    | 18   | 59   | 0     | 11  | 77    | 163   |
| Total   | 14   | 0    | 17    | 42  | 31    | 0    | 276  | 30    | 24  | 306   | 68   | 238  | 0     | 47  | 306   | 643   |
| PHF     | 0.88 |      | 0.71  |     | 0.86  |      | 0.87 | 0.75  |     | 0.86  | 0.85 | 0.89 |       |     | 0.93  |       |
| HV %    | 14   |      | 6     |     |       |      | 4    | 10    |     |       | 7    | 7    |       |     |       |       |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



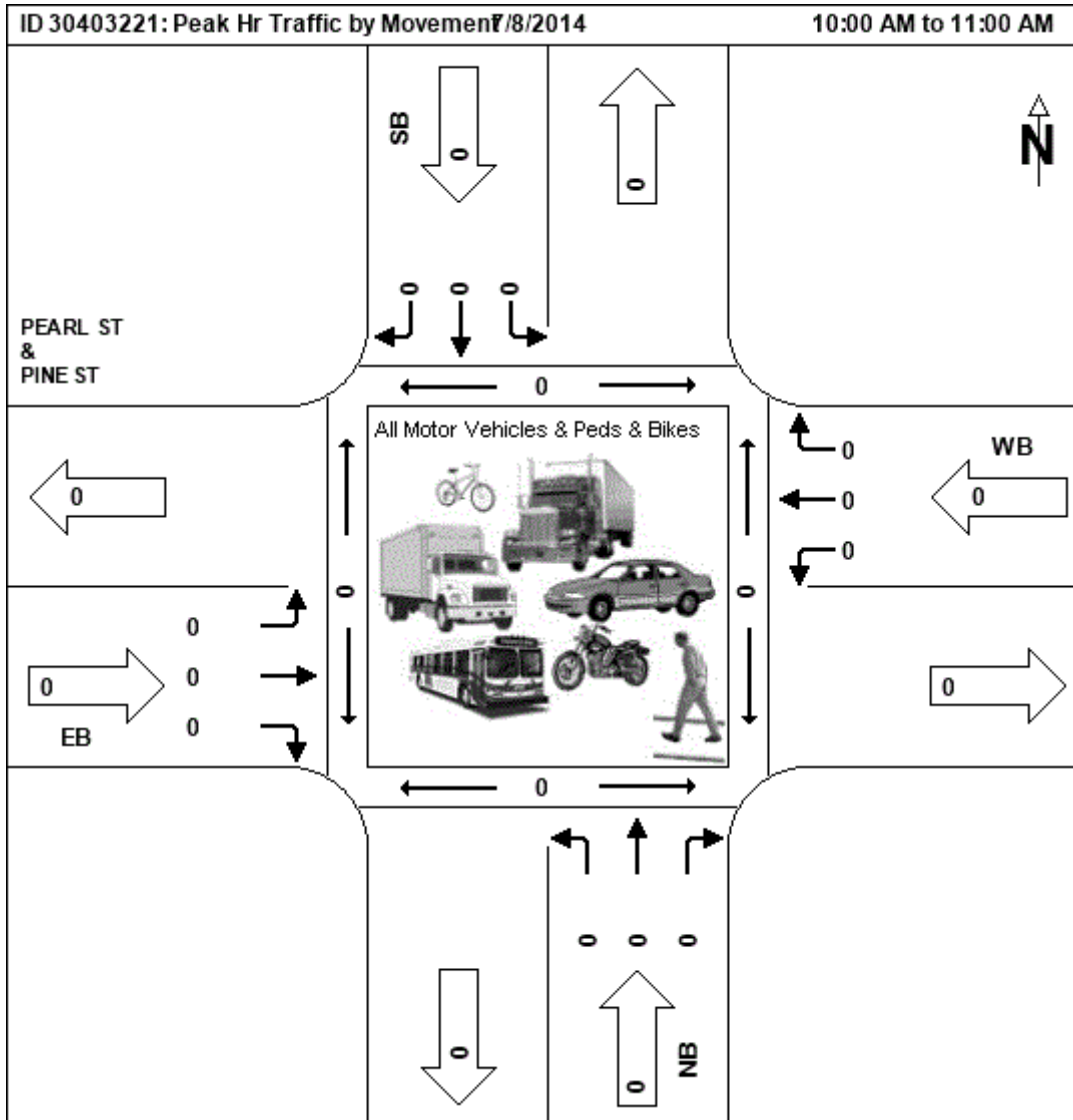
**Midday Peak Hour**  
**07/08/2014**

| NB       |      |      |       |     | EB    |      |      |       |     | WB    |      |      |       |     | App   | Int   |
|----------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|-------|
| Start    | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Int   |
| Time     |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total | Total |
| 10:00 AM | 0    | 0    | 0     | 0   | 0     | 0    | 0    | 0     | 0   | 0     | 0    | 0    | 0     | 0   | 0     | 0     |



[illegible]

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**07/08/2014**

| Start Time | NB   |      |       |     | App Total | EB   |      |       |     | App Total | WB   |      |       |     | App Total | Int Total |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
|            | Left | Thru | Right | Ped |           | Left | Thru | Right | Ped |           | Left | Thru | Right | Ped |           |           |
| 4:15 PM    | 6    | 0    | 18    | 16  | 24        | 0    | 69   | 0     | 14  | 69        | 9    | 80   | 0     | 5   | 89        | 182       |
| 4:30 PM    | 13   | 0    | 15    | 26  | 28        | 0    | 89   | 5     | 11  | 94        | 6    | 76   | 0     | 10  | 82        | 204       |
| 4:45 PM    | 9    | 0    | 15    | 20  | 24        | 0    | 68   | 5     | 4   | 73        | 4    | 92   | 0     | 6   | 96        | 193       |
| 5:00 PM    | 6    | 0    | 26    | 8   | 32        | 0    | 82   | 3     | 5   | 85        | 10   | 96   | 0     | 8   | 106       | 223       |
| Total      | 34   | 0    | 74    | 70  | 108       | 0    | 308  | 13    | 34  | 321       | 29   | 344  | 0     | 29  | 373       | 802       |
| PHF        | 0.65 |      | 0.71  |     | 0.84      | 0.87 | 0.65 |       |     | 0.85      | 0.73 | 0.90 |       |     | 0.88      |           |
| HV %       | 3    |      | 9     |     |           | 4    | 0    |       |     |           | 7    | 3    |       |     |           |           |

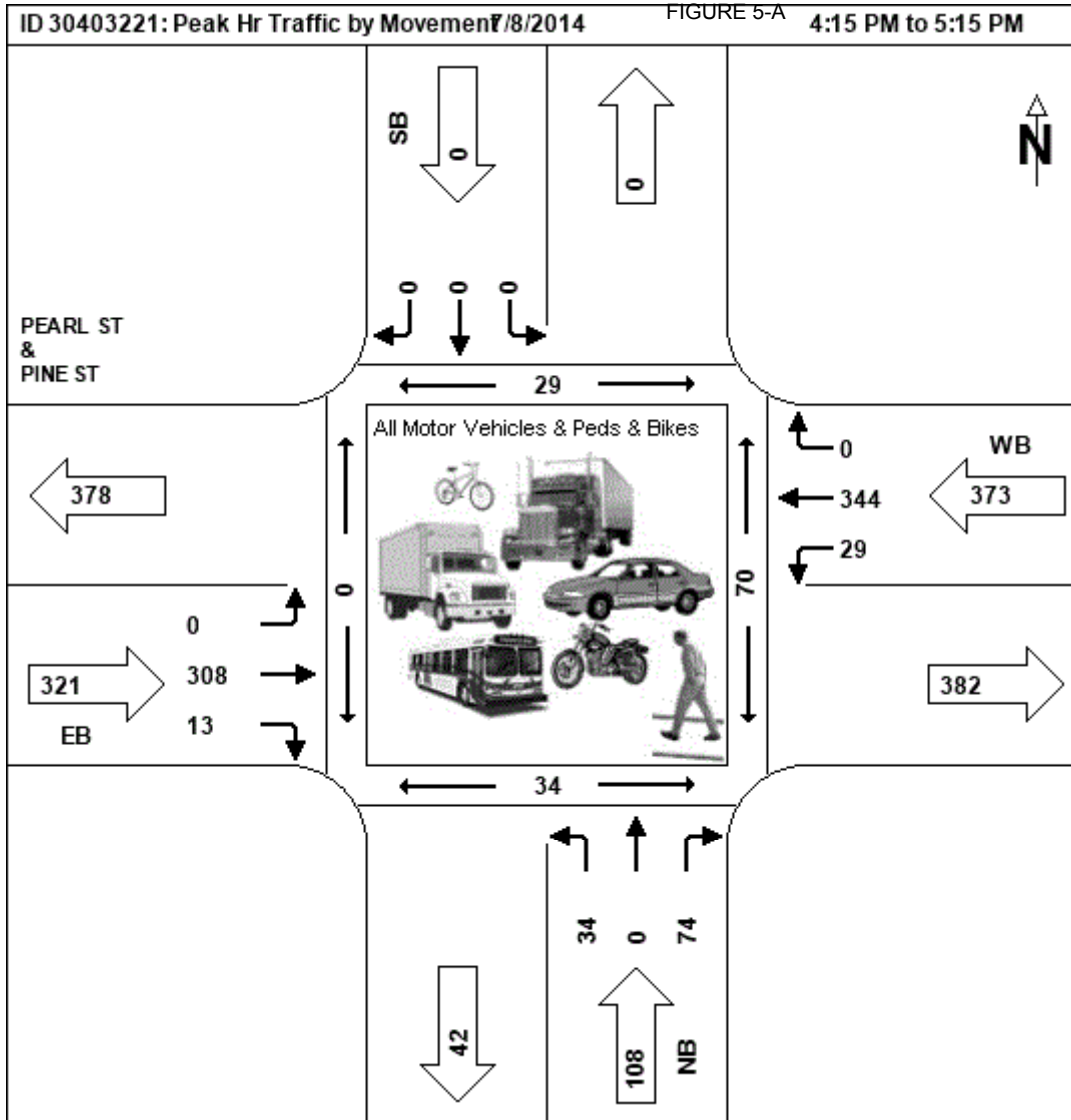


FIGURE 5-A

### Peak Hour Data for Intersection

**Int ID:** 30403620  
**Community:** BURLINGTON  
**Road 1:** ALT-7  
**Road 2:** PEARL ST

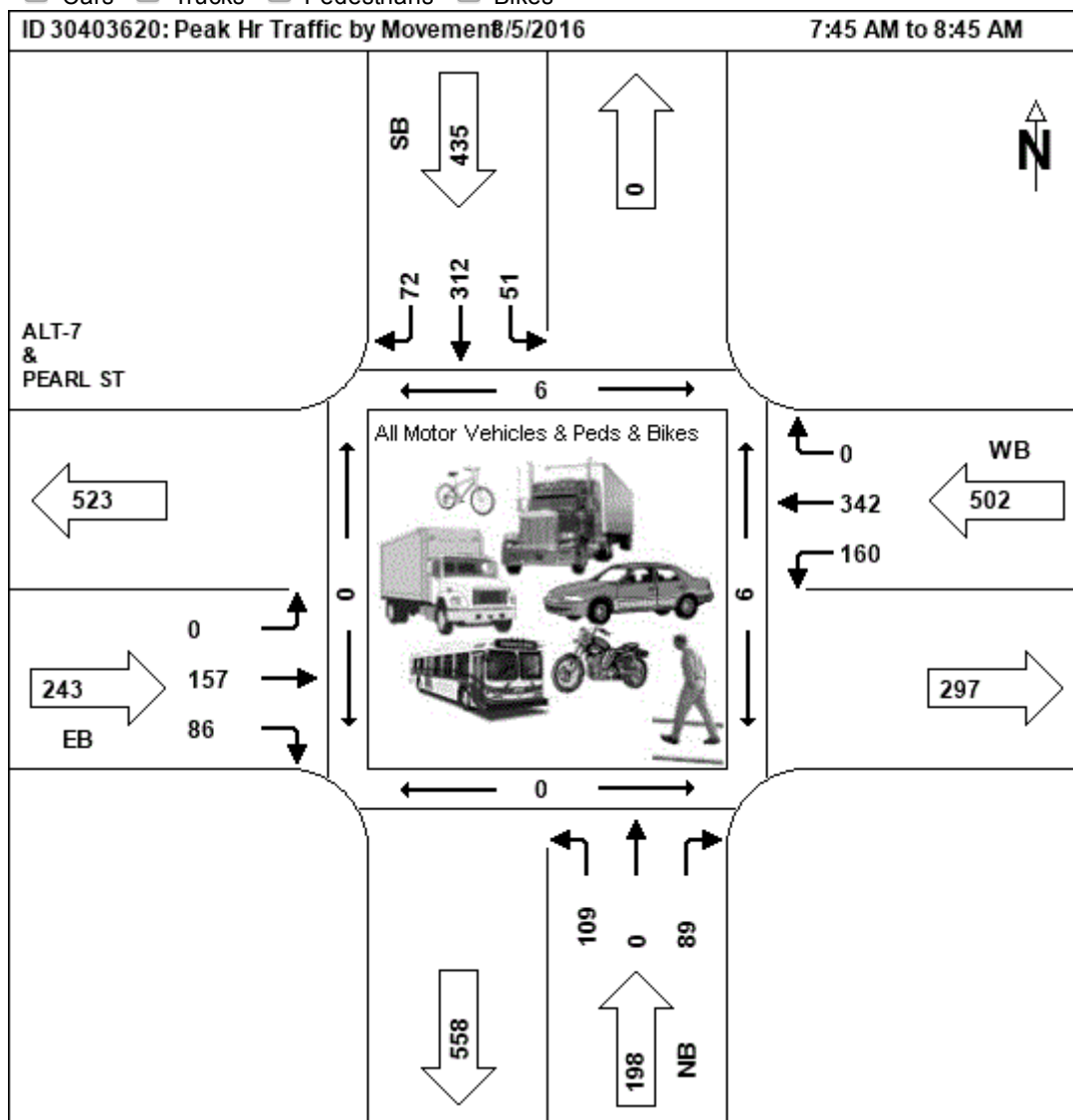
**Corridor:** NA  
**Road 3:** ALT-7  
**Road 4:** PEARL ST

1-5 of 5

**AM Peak Hour**  
**08/05/2016**

| NB         |      |      |       |     |           | EB   |      |       |     |           |      | SB   |       |     |           |      |      | WB    |     |           |           |  |  |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|--|--|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |  |  |
| 7:45 AM    | 25   | 0    | 19    | 0   | 44        | 0    | 50   | 23    | 0   | 73        | 9    | 74   | 23    | 0   | 106       | 34   | 94   | 0     | 0   | 128       | 1251      |  |  |
| 8:00 AM    | 28   | 0    | 23    | 0   | 51        | 0    | 33   | 21    | 0   | 54        | 11   | 76   | 18    | 0   | 105       | 34   | 87   | 0     | 0   | 121       | 331       |  |  |
| 8:15 AM    | 30   | 0    | 22    | 0   | 52        | 0    | 42   | 21    | 0   | 63        | 18   | 64   | 14    | 0   | 96        | 41   | 80   | 0     | 1   | 121       | 332       |  |  |
| 8:30 AM    | 26   | 0    | 25    | 6   | 51        | 0    | 32   | 21    | 0   | 53        | 13   | 98   | 17    | 0   | 128       | 51   | 81   | 0     | 5   | 132       | 364       |  |  |
| Total      | 109  | 0    | 89    | 6   | 198       | 0    | 157  | 86    | 0   | 243       | 51   | 312  | 72    | 0   | 435       | 160  | 342  | 0     | 6   | 502       | 1378      |  |  |
| PHF        | 0.91 |      | 0.89  |     | 0.95      |      | 0.79 | 0.93  |     | 0.83      | 0.71 | 0.80 | 0.78  |     | 0.85      | 0.78 | 0.91 |       |     | 0.95      |           |  |  |
| HV %       | 8    |      | 15    |     |           |      | 3    | 1     |     |           | 4    | 1    | 7     |     |           | 3    | 6    |       |     |           |           |  |  |

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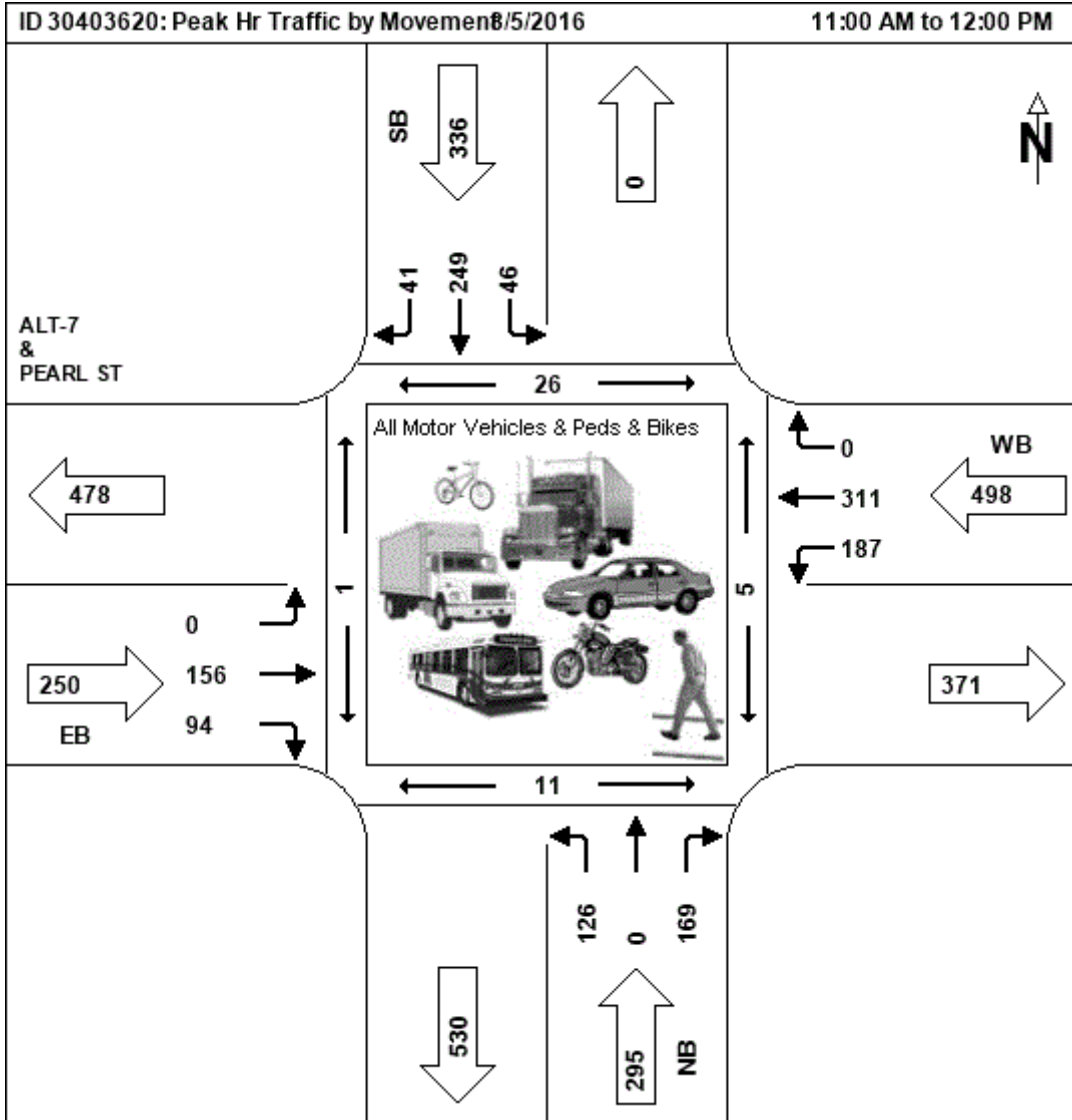
**Midday Peak Hour**  
**08/05/2016**

| Start Time | NB   |      |       |     | App Total | EB   |      |       |     | App Total | SB   |      |       |     | App Total | WB   |      |       |     | App Total | Int Total |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
|            | Left | Thru | Right | Ped |           | Left | Thru | Right | Ped |           | Left | Thru | Right | Ped |           | Left | Thru | Right | Ped |           |           |
| 11:00 AM   | 24   | 0    | 51    | 0   | 75        | 0    | 49   | 24    | 0   | 73        | 13   | 65   | 14    | 0   | 92        | 49   | 66   | 0     | 7   | 115       | 355       |



|          |      |   |      |   |      |   |      |      |    |      |      |      |      |    |      |      |      |     |    |      |      |
|----------|------|---|------|---|------|---|------|------|----|------|------|------|------|----|------|------|------|-----|----|------|------|
| 11:15 AM | 34   | 0 | 40   | 0 | 74   | 0 | 32   | 18   | 0  | 50   | 15   | 57   | 40   | 94 | 0    | 0    | 134  | 341 |    |      |      |
| 11:30 AM | 26   | 0 | 38   | 5 | 64   | 0 | 37   | 19   | 5  | 56   | 7    | 52   | 4    | 0  | 63   | 46   | 64   | 0   | 6  | 110  | 293  |
| 11:45 AM | 42   | 0 | 40   | 0 | 82   | 0 | 38   | 33   | 6  | 71   | 11   | 75   | 12   | 1  | 98   | 52   | 87   | 0   | 13 | 139  | 390  |
| Total    | 126  | 0 | 169  | 5 | 295  | 0 | 156  | 94   | 11 | 250  | 46   | 249  | 41   | 1  | 336  | 187  | 311  | 0   | 26 | 498  | 1379 |
| PHF      | 0.75 |   | 0.83 |   | 0.90 |   | 0.80 | 0.71 |    | 0.86 | 0.77 | 0.83 | 0.73 |    | 0.86 | 0.90 | 0.83 |     |    | 0.90 |      |
| HV %     | 9    |   | 5    |   |      |   | 4    | 5    |    |      | 2    | 3    | 2    |    |      | 2    | 5    |     |    |      |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**08/04/2016**

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:30 PM    | 43   | 0    | 64    | 14  | 107       | 0    | 64   | 25    | 17  | 89        | 20   | 49   | 14    | 10  | 83        | 44   | 86   | 0     | 6   | 130       | 409       |
| 4:45 PM    | 43   | 0    | 62    | 7   | 105       | 0    | 73   | 26    | 4   | 99        | 21   | 71   | 8     | 7   | 100       | 37   | 90   | 0     | 5   | 127       | 431       |
| 5:00 PM    | 31   | 0    | 63    | 7   | 94        | 0    | 64   | 27    | 14  | 91        | 18   | 64   | 11    | 0   | 93        | 54   | 99   | 0     | 11  | 153       | 431       |
| 5:15 PM    | 52   | 0    | 70    | 11  | 122       | 0    | 65   | 21    | 7   | 86        | 31   | 72   | 10    | 0   | 113       | 30   | 80   | 0     | 0   | 110       | 431       |
| Total      | 169  | 0    | 259   | 39  | 428       | 0    | 266  | 99    | 42  | 365       | 90   | 256  | 43    | 17  | 389       | 165  | 355  | 0     | 22  | 520       | 1702      |
| PHF        | 0.81 |      | 0.93  |     | 0.88      |      | 0.91 | 0.92  |     | 0.92      | 0.73 | 0.89 | 0.77  |     | 0.86      | 0.76 | 0.90 |       |     | 0.85      |           |
| HV %       | 4    |      | 2     |     |           |      | 3    | 0     |     |           | 0    | 1    | 9     |     |           | 1    | 2    |       |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

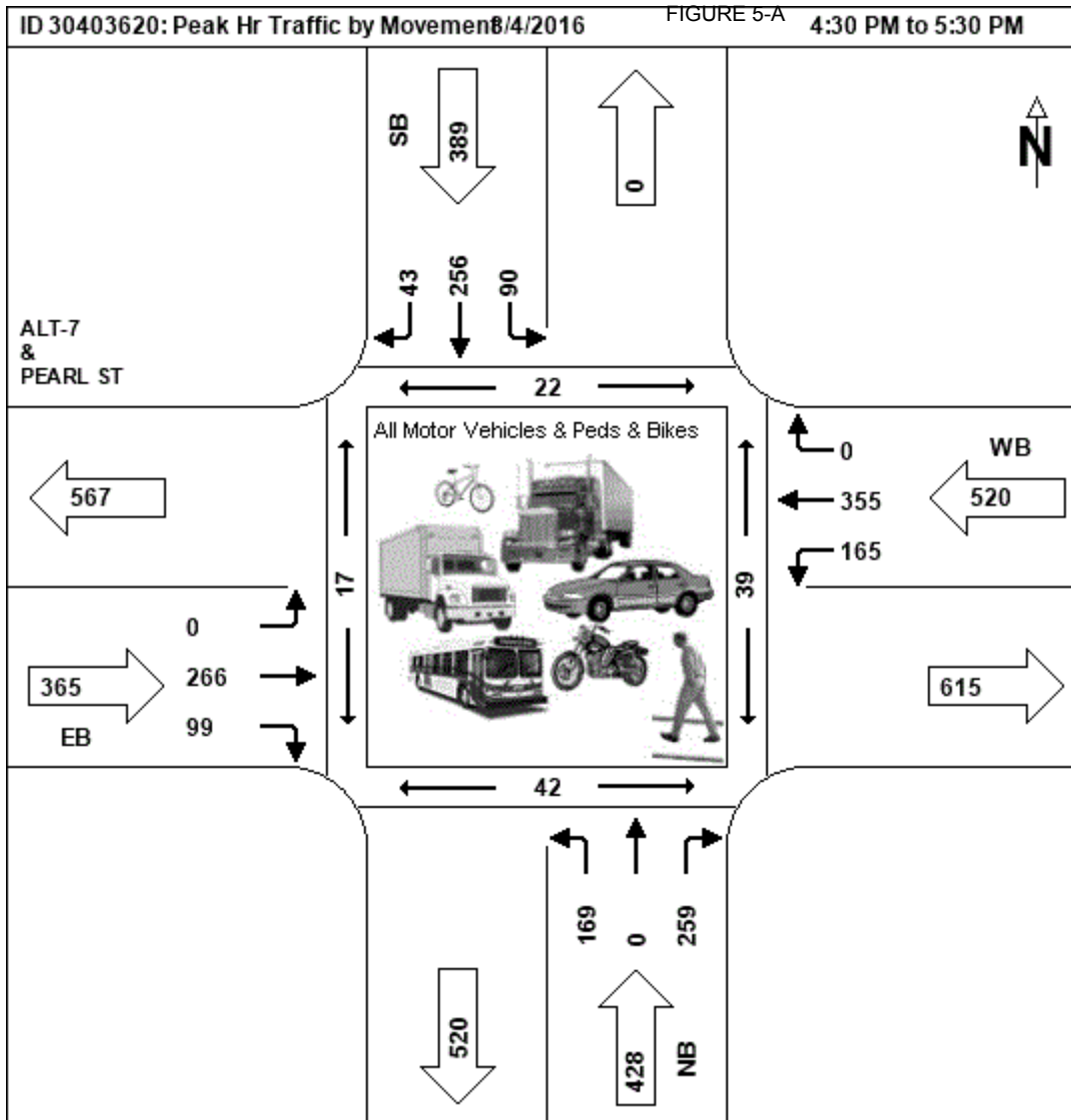


FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403325  
 Community: BURLINGTON  
 Road 1: N UNION ST  
 Road 2: PEARL ST

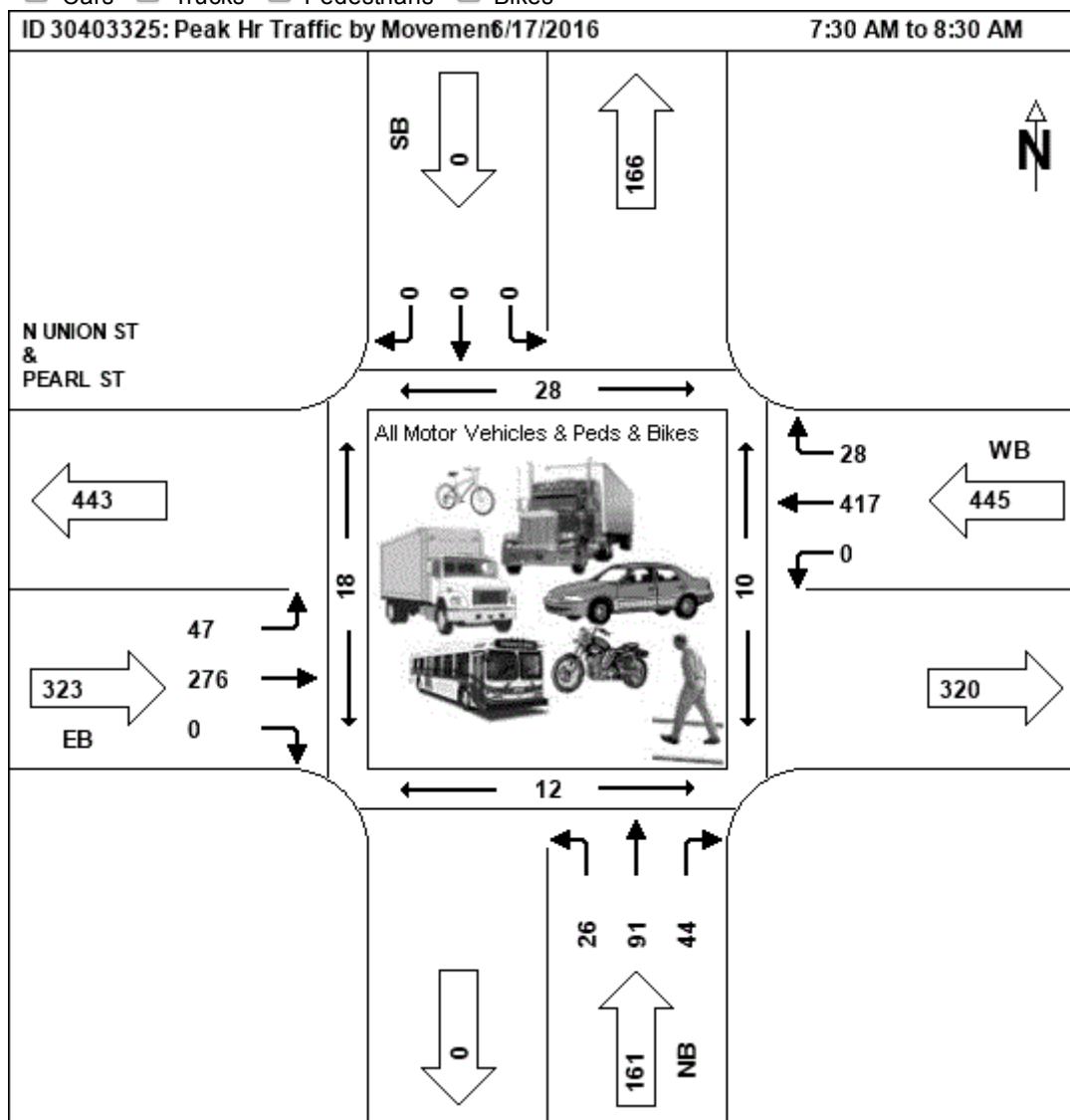
Corridor: NA  
 Road 3: S UNION ST  
 Road 4: PEARL ST

|<<|<|>|>>| 1-5 of 5

### AM Peak Hour 06/17/2016

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 7:30 AM    | 9    | 26   | 7     | 2   | 42        | 7    | 63   | 0     | 2   | 70        | 0    | 0    | 0     | 3   | 0         | 0    | 111  | 10    | 8   | 121       | 233       |
| 7:45 AM    | 6    | 19   | 11    | 2   | 36        | 17   | 66   | 0     | 3   | 83        | 0    | 0    | 0     | 4   | 0         | 0    | 117  | 3     | 7   | 120       | 239       |
| 8:00 AM    | 4    | 21   | 11    | 2   | 36        | 12   | 77   | 0     | 3   | 89        | 0    | 0    | 0     | 6   | 0         | 0    | 83   | 9     | 5   | 92        | 217       |
| 8:15 AM    | 7    | 25   | 15    | 4   | 47        | 11   | 70   | 0     | 4   | 81        | 0    | 0    | 0     | 5   | 0         | 0    | 106  | 6     | 8   | 112       | 240       |
| Total      | 26   | 91   | 44    | 10  | 161       | 47   | 276  | 0     | 12  | 323       | 0    | 0    | 0     | 18  | 0         | 0    | 417  | 28    | 28  | 445       | 929       |
| PHF        | 0.72 | 0.88 | 0.73  |     | 0.86      | 0.69 | 0.90 |       |     | 0.91      |      |      |       |     |           |      | 0.89 | 0.70  |     | 0.92      |           |
| HV %       | 0    | 1    | 2     |     |           | 13   | 5    |       |     |           |      |      |       |     |           |      | 5    | 0     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



### Midday Peak Hour 06/17/2016

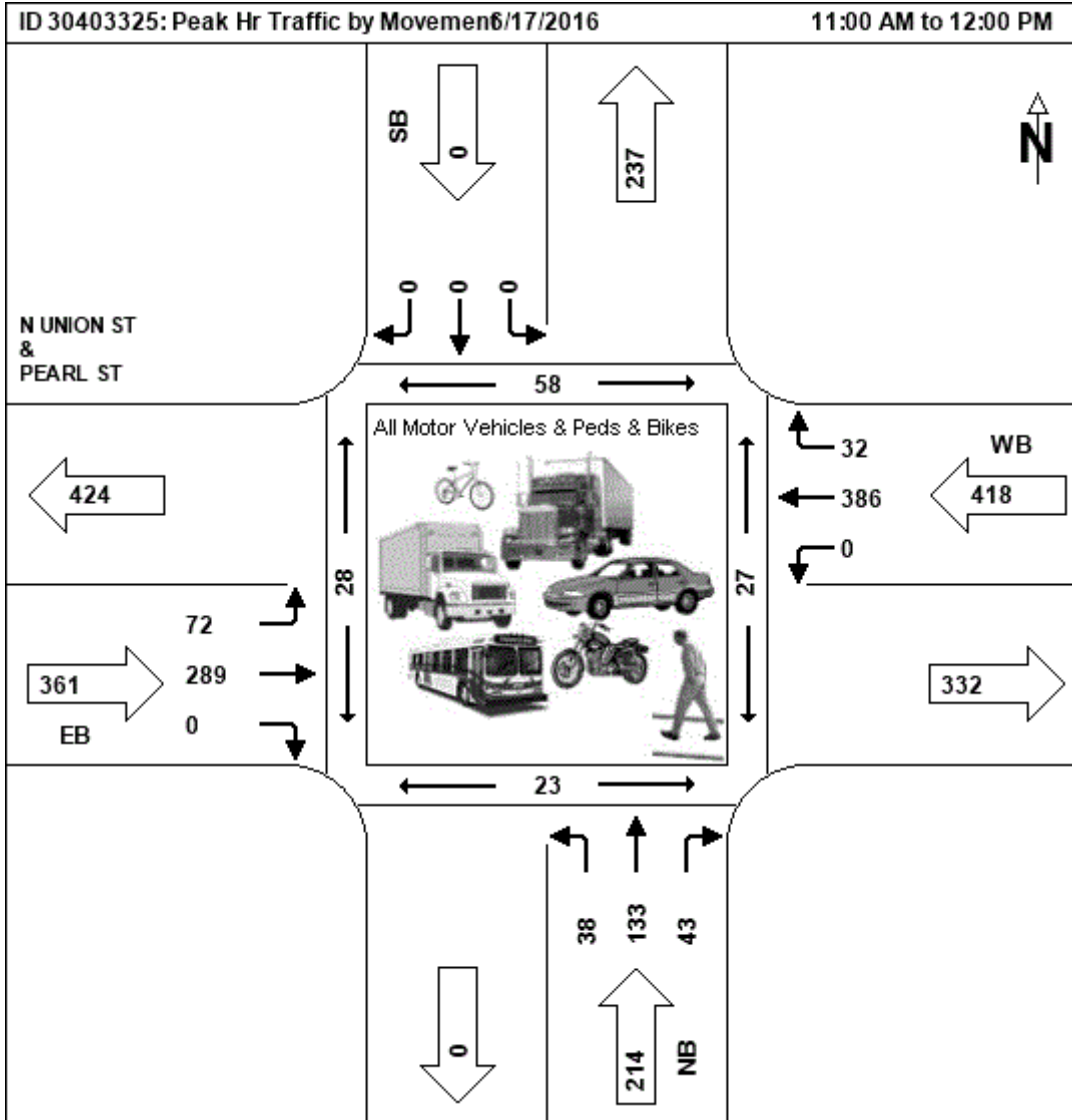
06/11/2019

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 11:00 AM   | 10   | 32   | 6     | 4   | 48        | 13   | 69   | 0     | 9   | 82        | 0    | 0    | 0     | 13  | 0         | 0    | 102  | 7     | 25  | 109       | 239       |



|          |    |     |    |    |      |      |      |      |    |      |   |   |            |    |   |   |      |      |    |      |     |     |
|----------|----|-----|----|----|------|------|------|------|----|------|---|---|------------|----|---|---|------|------|----|------|-----|-----|
| 11:15 AM | 6  | 35  | 6  | 7  | 47   | 19   | 64   | 0    | 5  | 83   | 0 | 0 | FIGURE 5-A |    |   |   | 0    | 89   | 9  | 8    | 98  | 228 |
| 11:30 AM | 12 | 36  | 15 | 7  | 63   | 19   | 71   | 0    | 3  | 90   | 0 | 0 | 0          | 10 | 0 | 0 | 98   | 5    | 4  | 103  | 256 |     |
| 11:45 AM | 10 | 30  | 16 | 9  | 56   | 21   | 85   | 0    | 6  | 106  | 0 | 0 | 0          | 1  | 0 | 0 | 97   | 11   | 21 | 108  | 270 |     |
| Total    | 38 | 133 | 43 | 27 | 214  | 72   | 289  | 0    | 23 | 361  | 0 | 0 | 0          | 28 | 0 | 0 | 386  | 32   | 58 | 418  | 993 |     |
| PHF      |    |     |    |    | 0.85 | 0.79 | 0.92 | 0.67 |    | 0.85 |   |   |            |    |   |   | 0.95 | 0.73 |    | 0.96 |     |     |
| HV %     | 0  | 1   | 0  |    |      | 7    | 2    |      |    |      |   |   |            |    |   |   | 2    | 13   |    |      |     |     |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/16/2016**

| NB         |       |      |       |     | EB        |       |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:45 PM    | 16    | 63   | 13    | 4   | 92        | 31    | 125  | 0     | 10  | 156       | 0    | 0    | 0     | 6   | 0         | 0    | 117  | 15    | 10  | 132       | 380       |
| 5:00 PM    | 8     | 78   | 12    | 9   | 98        | 41    | 115  | 0     | 9   | 156       | 0    | 0    | 0     | 2   | 0         | 0    | 103  | 9     | 12  | 112       | 366       |
| 5:15 PM    | 11    | 68   | 11    | 16  | 90        | 32    | 90   | 0     | 4   | 122       | 0    | 0    | 0     | 11  | 0         | 0    | 114  | 18    | 13  | 132       | 344       |
| 5:30 PM    | 9     | 54   | 11    | 9   | 74        | 38    | 102  | 0     | 14  | 140       | 0    | 0    | 0     | 8   | 0         | 0    | 117  | 13    | 18  | 130       | 344       |
| Total      | 44    | 263  | 47    | 38  | 354       | 142   | 432  | 0     | 37  | 574       | 0    | 0    | 0     | 27  | 0         | 0    | 451  | 55    | 53  | 506       | 1434      |
| PHF        | 0.690 | 0.84 | 0.90  |     | 0.90      | 0.870 | 0.86 |       |     | 0.92      |      |      |       |     |           |      | 0.96 | 0.76  |     | 0.96      |           |
| HV %       | 0     | 0    | 0     |     |           | 1     | 3    |       |     |           |      |      |       |     |           |      | 2    | 2     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

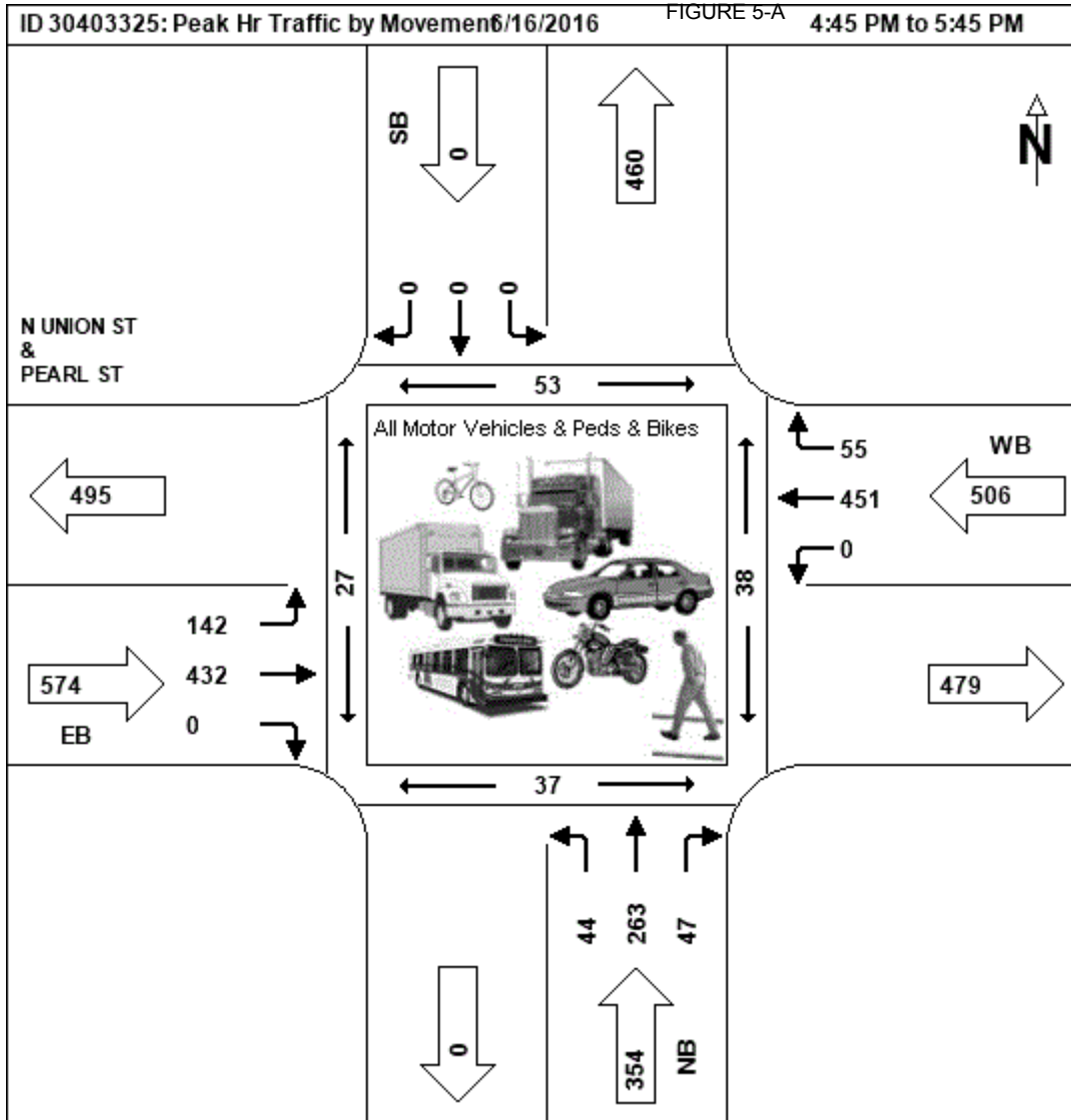


FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403745  
 Community: BURLINGTON  
 Road 1: US-7  
 Road 2: PEARL ST

Corridor: NA  
 Road 3: US-7  
 Road 4: PEARL ST

|<<|<|>|>>| 1-4 of 4

### AM Peak Hour 06/17/2016

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 7:45 AM    | 9    | 25   | 6     | 2   | 40        | 0    | 71   | 13    | 4   | 84        | 8    | 62   | 8     | 3   | 78        | 17   | 99   | 4     | 2   | 120       | 322       |
| 8:00 AM    | 4    | 23   | 9     | 2   | 36        | 3    | 71   | 15    | 4   | 89        | 5    | 47   | 6     | 3   | 58        | 6    | 90   | 3     | 2   | 99        | 282       |
| 8:15 AM    | 10   | 21   | 14    | 3   | 45        | 4    | 77   | 5     | 2   | 86        | 6    | 52   | 7     | 0   | 65        | 9    | 103  | 5     | 9   | 117       | 313       |
| 8:30 AM    | 5    | 24   | 15    | 0   | 44        | 5    | 71   | 7     | 2   | 83        | 3    | 48   | 9     | 2   | 60        | 11   | 120  | 3     | 8   | 134       | 321       |
| Total      | 28   | 93   | 44    | 7   | 165       | 12   | 290  | 40    | 12  | 342       | 22   | 209  | 30    | 8   | 261       | 43   | 412  | 15    | 21  | 470       | 1238      |
| PHF        | 0.70 | 0.93 | 0.73  |     | 0.92      | 0.60 | 0.94 | 0.67  |     | 0.96      | 0.69 | 0.84 | 0.83  |     | 0.84      | 0.63 | 0.86 | 0.75  |     | 0.88      |           |
| HV %       | 4    | 6    | 2     |     |           | 0    | 5    | 3     |     |           | 0    | 3    | 3     |     |           | 0    | 4    | 0     |     |           |           |

☒

 Cars

☒

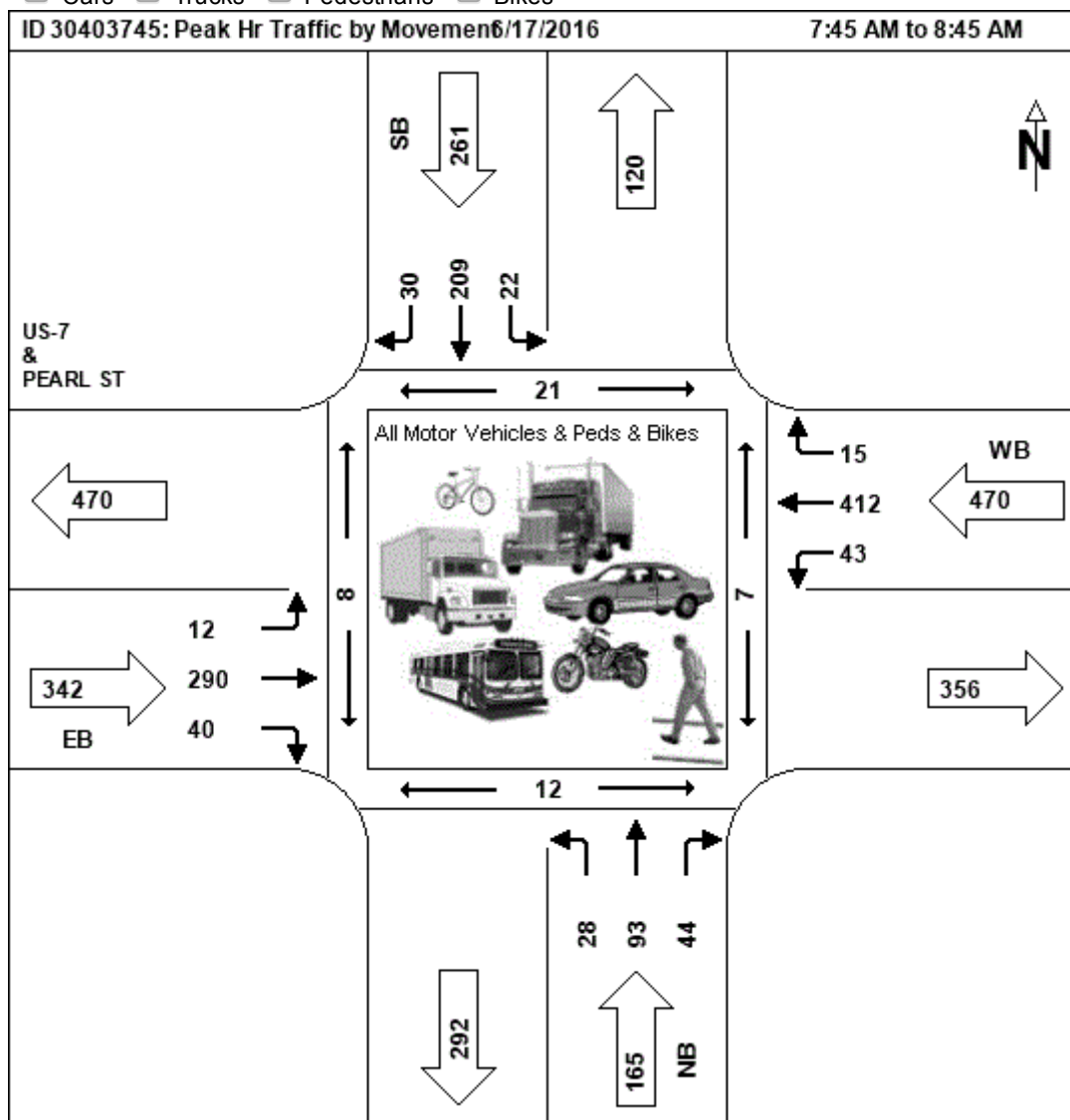
 Trucks

☒

 Pedestrians

☒

 Bikes



### Midday Peak Hour 06/17/2016

06/11/2019

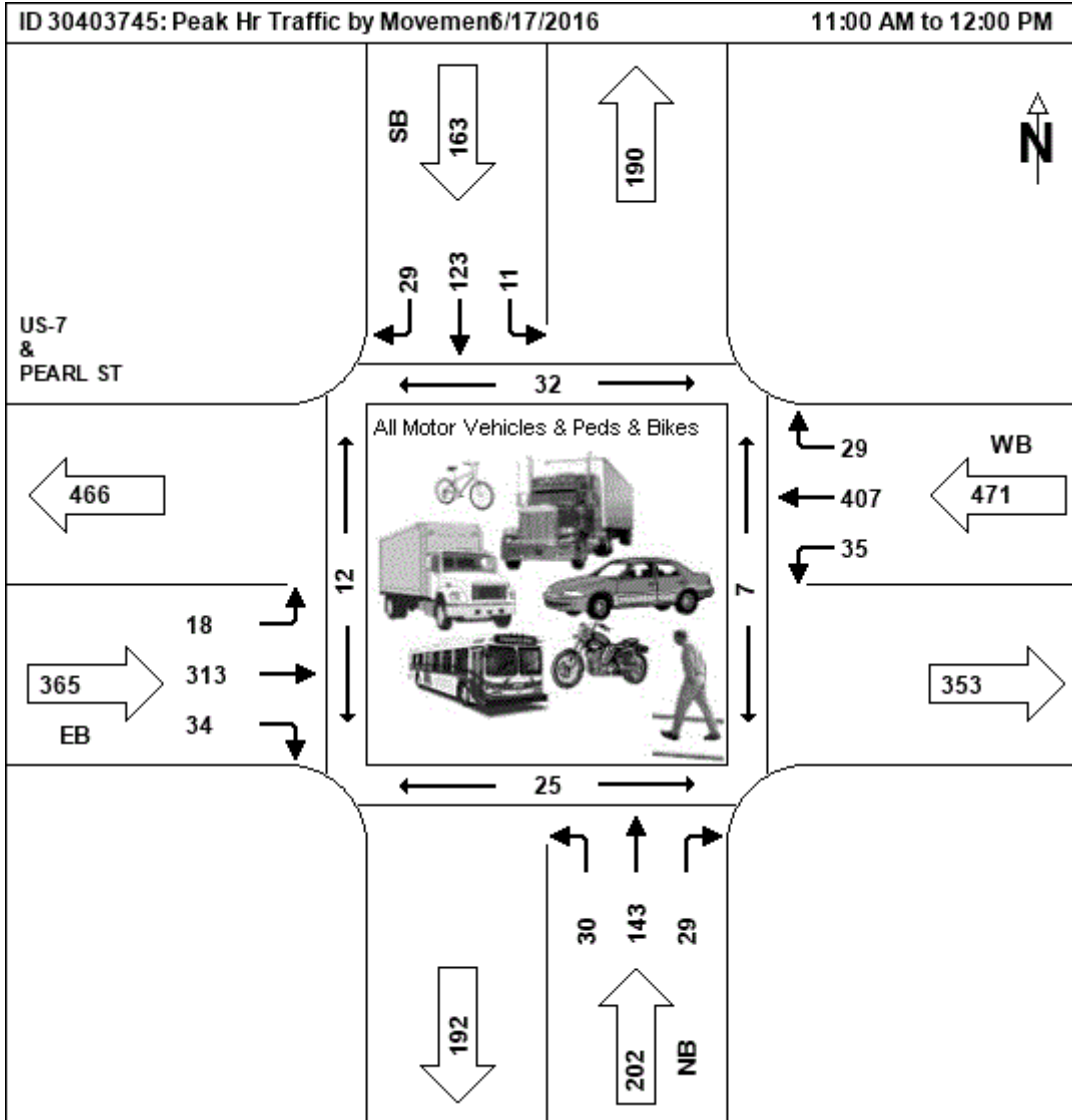
| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 11:00 AM   | 8    | 34   | 5     | 3   | 47        | 2    | 76   | 9     | 7   | 87        | 4    | 26   | 6     | 0   | 36        | 10   | 112  | 7     | 13  | 129       | 299       |



FIGURE 5-A

|          |      |      |      |   |      |      |      |      |    |      |      |      |      |    |      |      |      |      |     |      |      |
|----------|------|------|------|---|------|------|------|------|----|------|------|------|------|----|------|------|------|------|-----|------|------|
| 11:15 AM | 8    | 36   | 7    | 2 | 51   | 3    | 74   | 8    | 7  | 85   | 3    | 31   | 5    | 4  | 8    | 102  | 7    | 7    | 117 | 293  |      |
| 11:30 AM | 8    | 36   | 8    | 0 | 52   | 4    | 72   | 6    | 6  | 82   | 2    | 36   | 6    | 6  | 44   | 5    | 91   | 6    | 1   | 102  | 280  |
| 11:45 AM | 6    | 37   | 9    | 2 | 52   | 9    | 91   | 11   | 5  | 111  | 2    | 30   | 11   | 3  | 43   | 12   | 102  | 9    | 11  | 123  | 329  |
| Total    | 30   | 143  | 29   | 7 | 202  | 18   | 313  | 34   | 25 | 365  | 11   | 123  | 29   | 12 | 163  | 35   | 407  | 29   | 32  | 471  | 1201 |
| PHF      | 0.94 | 0.97 | 0.81 |   | 0.97 | 0.50 | 0.86 | 0.77 |    | 0.82 | 0.69 | 0.85 | 0.66 |    | 0.93 | 0.73 | 0.91 | 0.81 |     | 0.91 |      |
| HV %     | 10   | 4    | 3    |   |      | 11   | 4    | 3    |    |      | 0    | 3    | 7    |    |      | 0    | 3    | 0    |     |      |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/16/2016**

| NB         |              |      |       |     |           | EB           |      |       |     |           |              | SB   |       |     |           |              |      | WB    |     |           |           |  |  |
|------------|--------------|------|-------|-----|-----------|--------------|------|-------|-----|-----------|--------------|------|-------|-----|-----------|--------------|------|-------|-----|-----------|-----------|--|--|
| Start Time | Left         | Thru | Right | Ped | App Total | Left         | Thru | Right | Ped | App Total | Left         | Thru | Right | Ped | App Total | Left         | Thru | Right | Ped | App Total | Int Total |  |  |
| 4:15 PM    | 10           | 55   | 10    | 0   | 75        | 4            | 114  | 6     | 0   | 124       | 4            | 54   | 7     | 0   | 65        | 7            | 106  | 5     | 0   | 118       | 382       |  |  |
| 4:30 PM    | 17           | 56   | 14    | 1   | 87        | 10           | 98   | 12    | 0   | 120       | 6            | 36   | 11    | 0   | 53        | 18           | 105  | 13    | 4   | 136       | 396       |  |  |
| 4:45 PM    | 19           | 48   | 10    | 0   | 77        | 13           | 112  | 6     | 5   | 131       | 10           | 44   | 9     | 0   | 63        | 16           | 125  | 12    | 1   | 153       | 424       |  |  |
| 5:00 PM    | 9            | 71   | 16    | 0   | 96        | 14           | 107  | 13    | 0   | 134       | 5            | 31   | 6     | 4   | 42        | 10           | 100  | 10    | 0   | 120       | 392       |  |  |
| Total      | 55           | 230  | 50    | 1   | 335       | 41           | 431  | 37    | 5   | 509       | 25           | 165  | 33    | 4   | 223       | 51           | 436  | 40    | 5   | 527       | 1594      |  |  |
| PHF        | 0.720.810.78 |      |       |     | 0.87      | 0.730.950.71 |      |       |     | 0.95      | 0.630.760.75 |      |       |     | 0.86      | 0.710.870.77 |      |       |     | 0.86      |           |  |  |
| HV %       | 0            | 1    | 2     |     |           | 2            | 3    | 0     |     |           | 0            | 1    | 0     |     |           | 2            | 3    | 0     |     |           |           |  |  |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

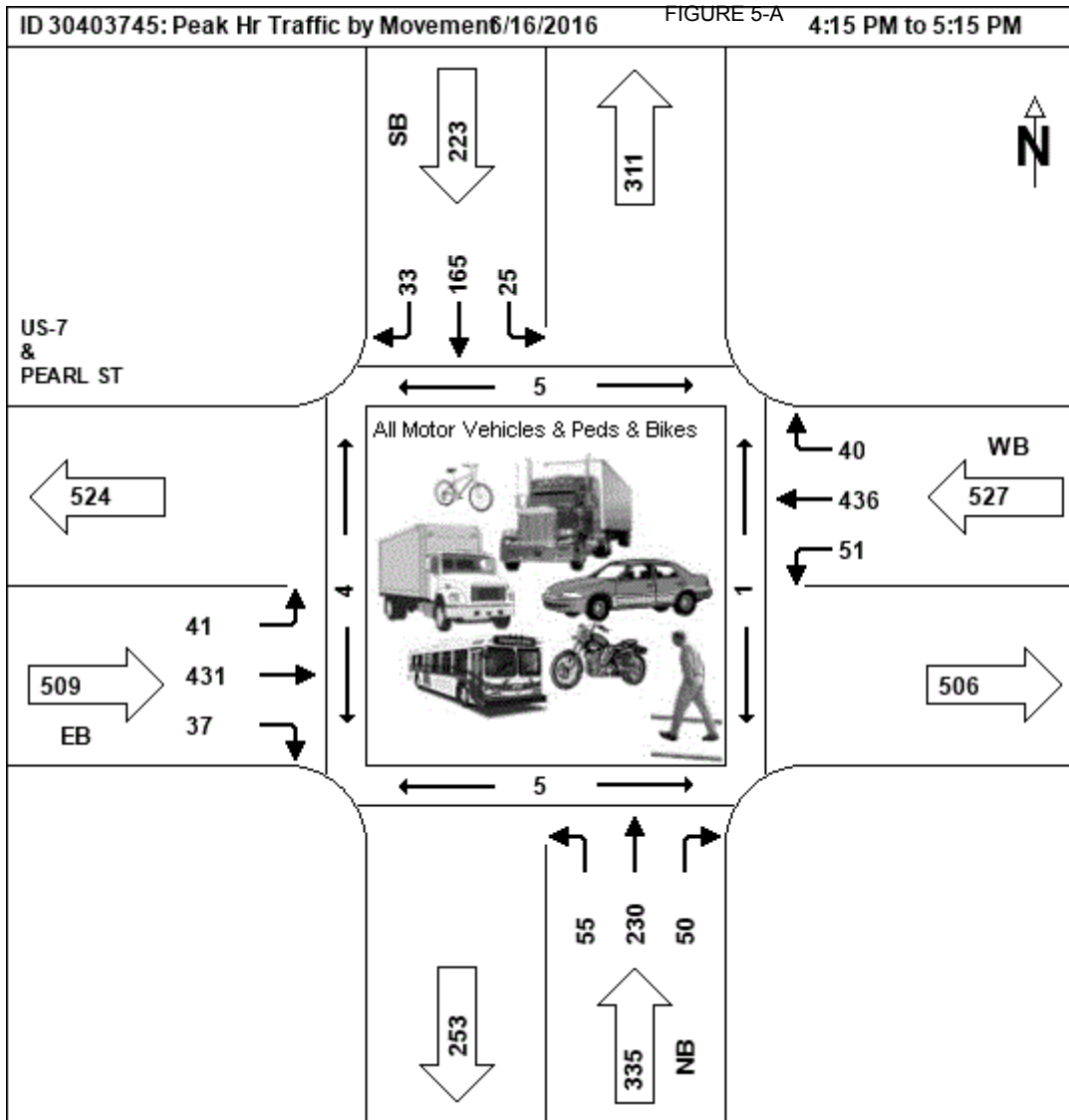


FIGURE 5-A

## Peak Hour Data for Intersection

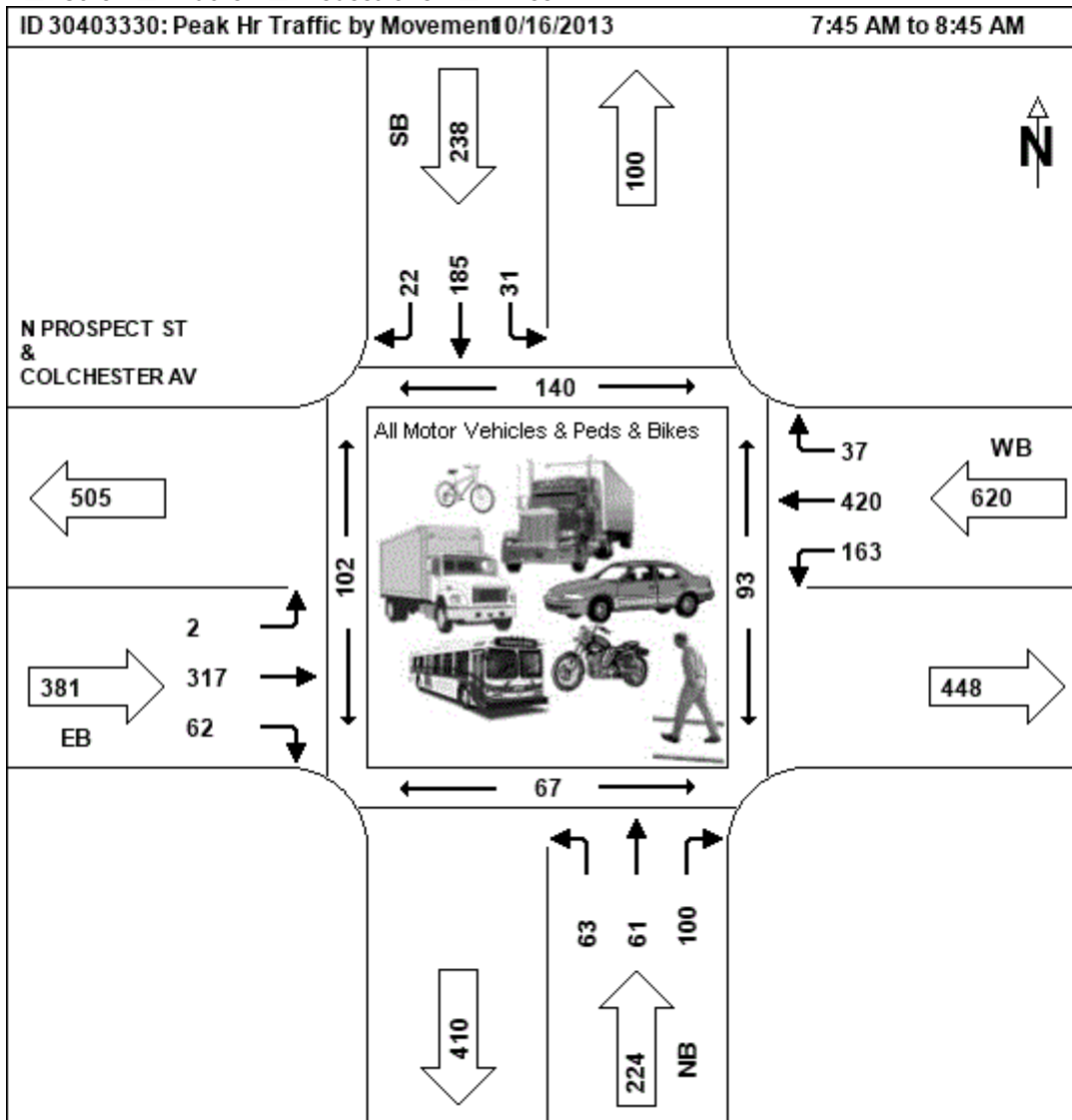
Int ID: 30403330  
 Community: BURLINGTON  
 Road 1: N PROSPECT ST  
 Road 2: COLCHESTER AV

Corridor: NA  
 Road 3: S PROSPECT ST  
 Road 4: PEARL ST

|<<|<|>|>>| 1-5 of 5

### AM Peak Hour 10/16/2013

| NB                                                                                                                                                                                                |      |      |       |     |           | EB   |      |       |     |           |      | SB   |       |     |           |      |      | WB    |     |           |            |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------------|--|--|
| Start Time                                                                                                                                                                                        | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int. Total |  |  |
| 7:45 AM                                                                                                                                                                                           | 13   | 15   | 28    | 37  | 56        | 0    | 76   | 28    | 25  | 104       | 9    | 33   | 6     | 35  | 48        | 43   | 109  | 12    | 39  | 164       | 372        |  |  |
| 8:00 AM                                                                                                                                                                                           | 20   | 20   | 30    | 19  | 70        | 0    | 89   | 7     | 5   | 96        | 9    | 55   | 4     | 18  | 68        | 38   | 112  | 12    | 26  | 162       | 396        |  |  |
| 8:15 AM                                                                                                                                                                                           | 18   | 12   | 22    | 30  | 52        | 1    | 81   | 20    | 28  | 102       | 7    | 46   | 5     | 30  | 58        | 42   | 96   | 7     | 53  | 145       | 357        |  |  |
| 8:30 AM                                                                                                                                                                                           | 12   | 14   | 20    | 7   | 46        | 1    | 71   | 7     | 9   | 79        | 6    | 51   | 7     | 19  | 64        | 40   | 103  | 6     | 22  | 149       | 338        |  |  |
| Total                                                                                                                                                                                             | 63   | 61   | 100   | 93  | 224       | 2    | 317  | 62    | 67  | 381       | 31   | 185  | 22    | 102 | 238       | 163  | 420  | 37    | 140 | 620       | 1463       |  |  |
| PHF                                                                                                                                                                                               | 0.79 | 0.76 | 0.83  |     | 0.80      | 0.50 | 0.89 | 0.55  |     | 0.92      | 0.86 | 0.84 | 0.79  |     | 0.88      | 0.95 | 0.94 | 0.77  |     | 0.95      |            |  |  |
| HV %                                                                                                                                                                                              | 6    | 0    | 13    |     |           | 0    | 5    | 0     |     |           | 0    | 2    | 0     |     |           | 11   | 5    | 3     |     |           |            |  |  |
| <div><input checked="" type="checkbox"/> Cars    <input checked="" type="checkbox"/> Trucks    <input checked="" type="checkbox"/> Pedestrians    <input checked="" type="checkbox"/> Bikes</div> |      |      |       |     |           |      |      |       |     |           |      |      |       |     |           |      |      |       |     |           |            |  |  |



### Midday Peak Hour 10/16/2013

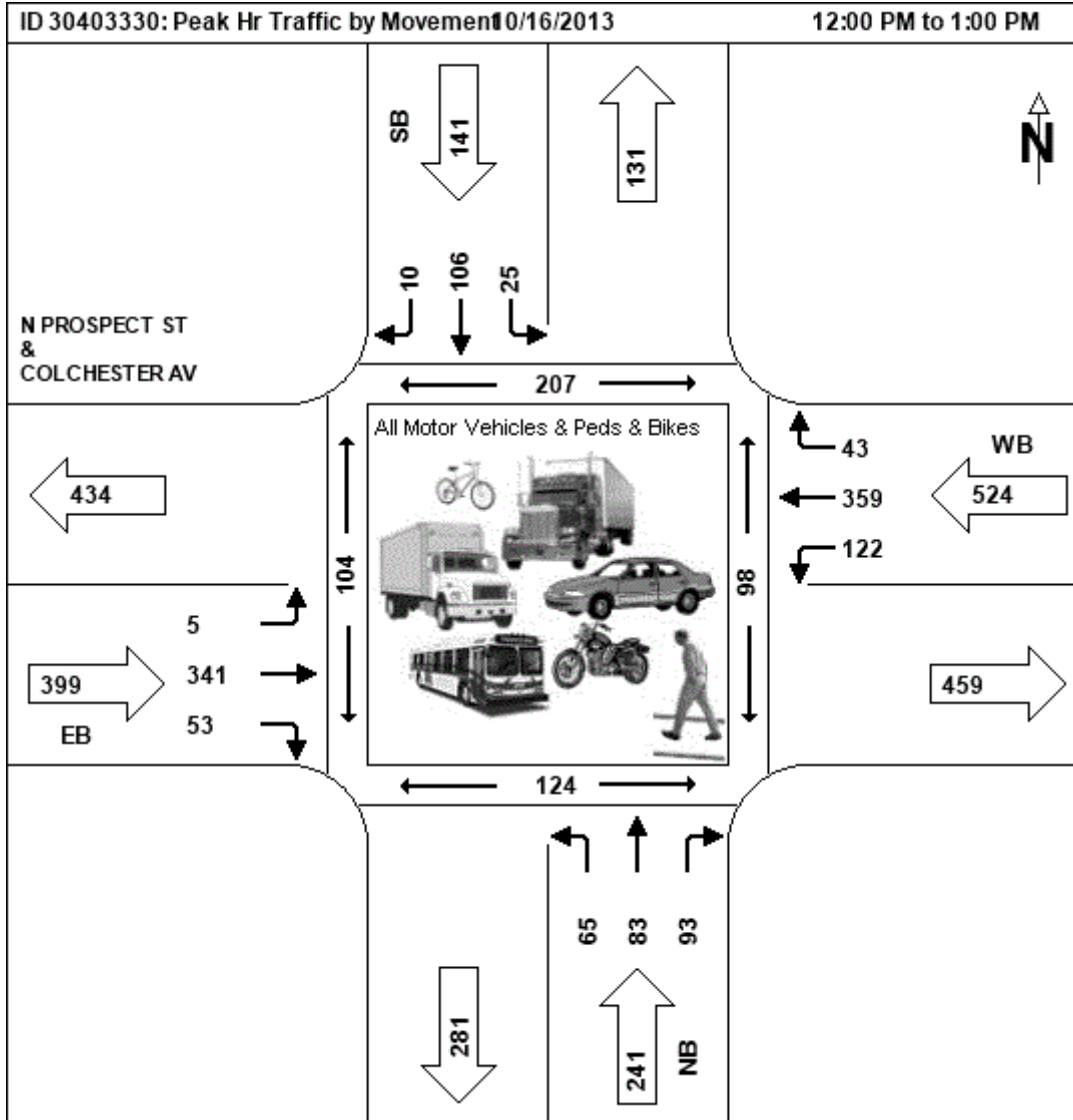
| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 12:00 PM   | 16   | 24   | 32    | 20  | 72        | 0    | 71   | 21    | 22  | 92        | 10   | 21   | 2     | 17  | 33        | 28   | 81   | 10    | 15  | 119       | 316       |



FIGURE 5-A

|          |      |      |      |    |      |      |      |      |     |      |      |      |      |     |      |      |      |      |     |      |      |
|----------|------|------|------|----|------|------|------|------|-----|------|------|------|------|-----|------|------|------|------|-----|------|------|
| 12:15 PM | 13   | 15   | 21   | 9  | 49   | 1    | 87   | 11   | 17  | 99   | 2    | 27   | 33   | 90  | 9    | 16   | 132  | 310  |     |      |      |
| 12:30 PM | 20   | 22   | 17   | 39 | 59   | 3    | 78   | 11   | 54  | 92   | 6    | 19   | 6    | 42  | 31   | 34   | 76   | 10   | 140 | 120  | 302  |
| 12:45 PM | 16   | 22   | 23   | 30 | 61   | 1    | 105  | 10   | 31  | 116  | 7    | 39   | 1    | 29  | 47   | 27   | 112  | 14   | 36  | 153  | 377  |
| Total    | 65   | 83   | 93   | 98 | 241  | 5    | 341  | 53   | 124 | 399  | 25   | 106  | 10   | 104 | 141  | 122  | 359  | 43   | 207 | 524  | 1305 |
| PHF      | 0.81 | 0.86 | 0.73 |    | 0.84 | 0.42 | 0.81 | 0.63 |     | 0.86 | 0.63 | 0.68 | 0.42 |     | 0.75 | 0.90 | 0.80 | 0.77 |     | 0.86 |      |
| HV %     | 8    | 2    | 9    |    |      | 0    | 5    | 4    |     |      | 8    | 6    | 10   |     |      | 12   | 4    | 2    |     |      |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**10/16/2013**

| NB         |       |      |       |     |           | EB    |      |       |     |           | SB    |      |       |     |           | WB    |      |       |     |           |           |
|------------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|-----------|
| Start Time | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Int Total |
| 5:00 PM    | 31    | 49   | 46    | 39  | 126       | 0     | 104  | 7     | 57  | 111       | 3     | 26   | 3     | 31  | 32        | 42    | 117  | 11    | 48  | 170       | 439       |
| 5:15 PM    | 33    | 62   | 29    | 22  | 124       | 1     | 89   | 7     | 33  | 97        | 7     | 23   | 3     | 41  | 33        | 29    | 115  | 24    | 56  | 168       | 422       |
| 5:30 PM    | 36    | 53   | 43    | 33  | 132       | 2     | 97   | 19    | 27  | 118       | 7     | 24   | 2     | 28  | 33        | 32    | 115  | 15    | 30  | 162       | 445       |
| 5:45 PM    | 25    | 45   | 37    | 26  | 107       | 1     | 103  | 14    | 19  | 118       | 5     | 22   | 2     | 25  | 29        | 18    | 120  | 24    | 30  | 162       | 416       |
| Total      | 125   | 209  | 155   | 120 | 489       | 4     | 393  | 47    | 136 | 444       | 22    | 95   | 10    | 125 | 127       | 121   | 467  | 74    | 164 | 662       | 1722      |
| PHF        | 0.870 | 0.84 | 0.84  |     | 0.93      | 0.500 | 0.94 | 0.62  |     | 0.94      | 0.790 | 0.91 | 0.83  |     | 0.96      | 0.720 | 0.97 | 0.77  |     | 0.97      |           |
| HV %       | 0     | 0    | 0     | 5   |           | 0     | 3    | 0     |     |           | 0     | 3    | 0     |     |           | 7     | 1    | 0     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

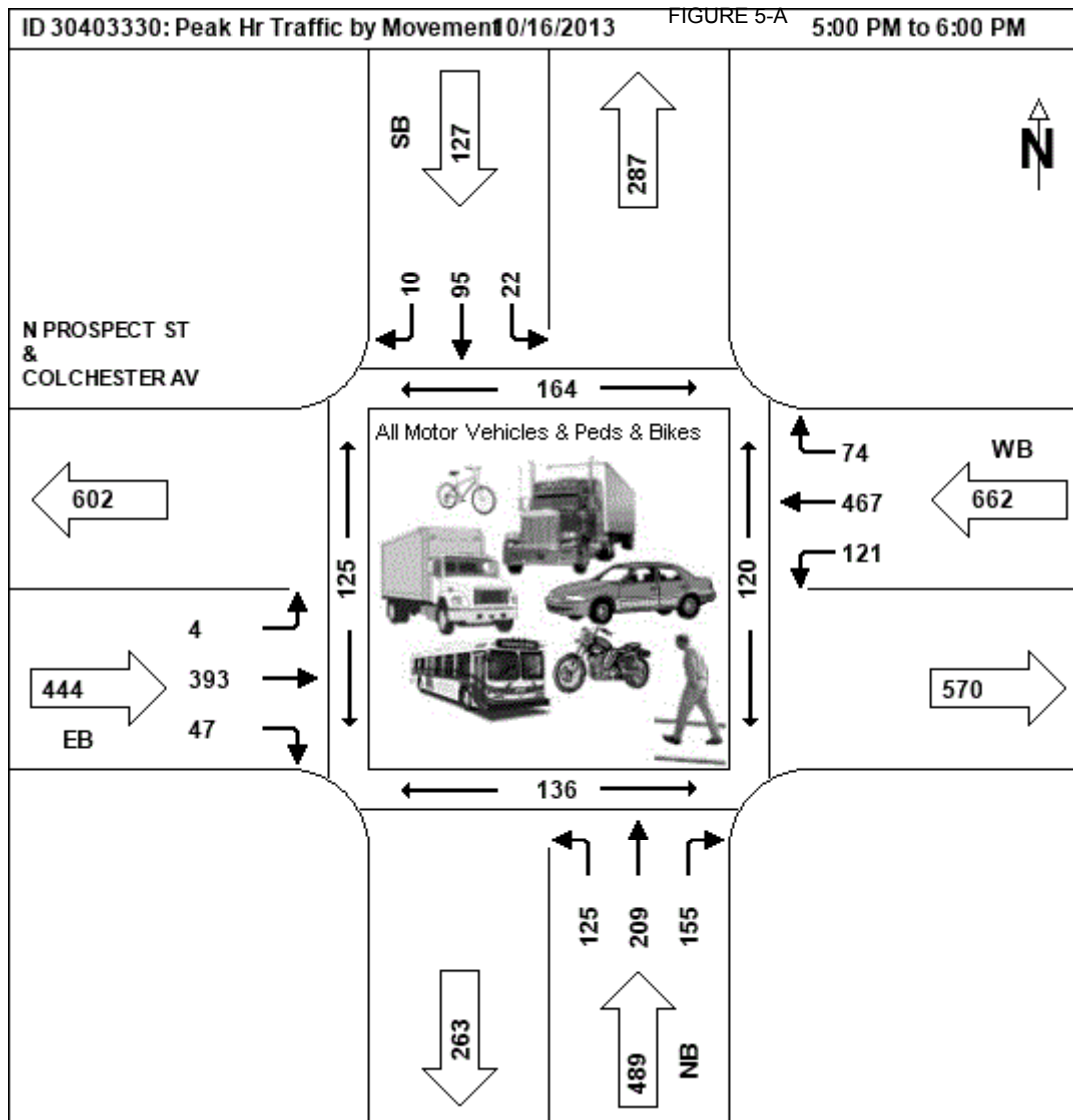


FIGURE 5-A



# Computations - Traffic Volumes

**Project:** BTV Town Center **Project #:** 57881.00  
**Location:** Burlington, VT **Sheet:**  
**Calculated by:** E. Quallen **Date:** 12/2/16  
**Checked by:** **Date:**  
**Title:** BTV Town Center Traffic Counts  
**Intersection:** College St / Pine St

Intersection: College St / Pine St  
 Count Date(s): 11/30/2016

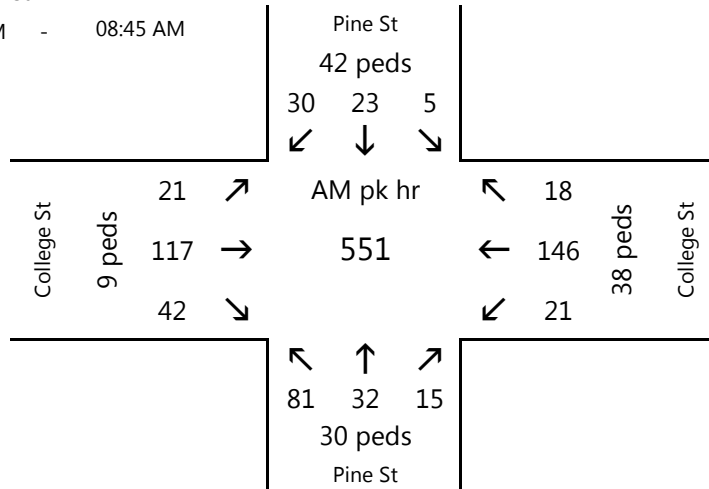
Town: Burlington  
 Counter: VHB

## Peak Hour Volumes

|          | SB      |      |    |     | WB         |      |    |     | NB      |      |    |     | EB         |      |    |     | Total |
|----------|---------|------|----|-----|------------|------|----|-----|---------|------|----|-----|------------|------|----|-----|-------|
|          | Pine St |      |    |     | College St |      |    |     | Pine St |      |    |     | College St |      |    |     |       |
|          | RT      | Thru | LT | Ped | RT         | Thru | LT | Ped | RT      | Thru | LT | Ped | RT         | Thru | LT | Ped |       |
| AM pk hr | 30      | 23   | 5  | 42  | 18         | 146  | 21 | 38  | 15      | 32   | 81 | 30  | 42         | 117  | 21 | 9   | 551   |
| PM pk hr | 52      | 65   | 20 | 51  | 12         | 111  | 34 | 45  | 21      | 39   | 32 | 43  | 97         | 131  | 24 | 28  | 638   |

## AM Peak Hour

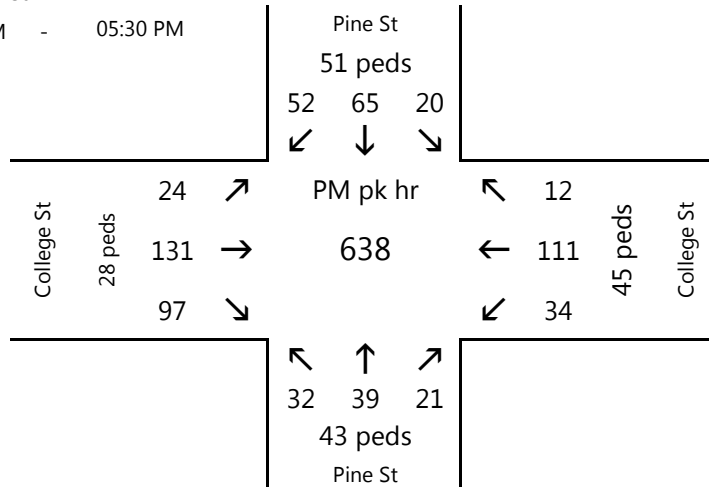
07:45 AM - 08:45 AM



% Auto: 80.1%  
 % Med: 0.0%  
 % Heavy: 2.1%  
 total % Trucks: 2.1%

## PM Peak Hour

04:30 PM - 05:30 PM



% Auto: 79.3%  
 % Med: 0.0%  
 % Heavy: 0.0%  
 total % Trucks: 0.0%



FIGURE 5-A



# Computations - Traffic Volumes

**Project:** BTV Town Center **Project #:** 57881.00  
**Location:** Burlington, VT **Sheet:** \_\_\_\_\_  
**Calculated by:** E. Quallen **Date:** 12/2/16  
**Checked by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Title:** BTV Town Center Traffic Counts  
**Intersection:** College St / St Paul St

Intersection: College St / St Paul St  
 Count Date(s): 12/1/2016

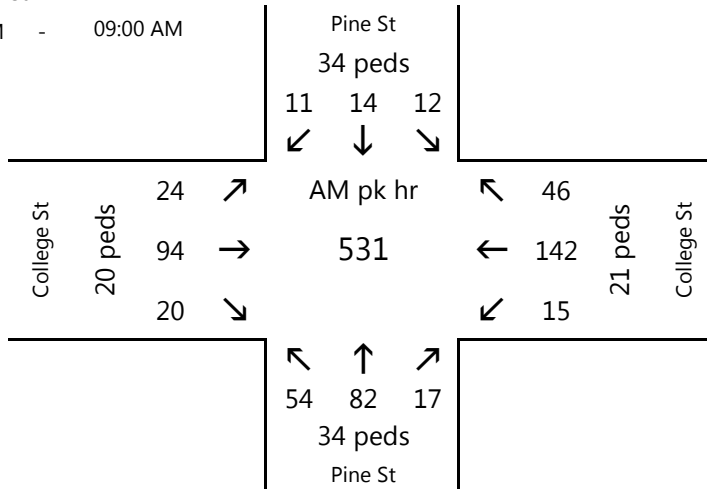
Town: Burlington  
 Counter: VHB

## Peak Hour Volumes

|          | SB      |      |    |     | WB         |      |    |     | NB      |      |    |     | EB         |      |    |     | Total |
|----------|---------|------|----|-----|------------|------|----|-----|---------|------|----|-----|------------|------|----|-----|-------|
|          | Pine St |      |    |     | College St |      |    |     | Pine St |      |    |     | College St |      |    |     |       |
|          | RT      | Thru | LT | Ped | RT         | Thru | LT | Ped | RT      | Thru | LT | Ped | RT         | Thru | LT | Ped |       |
| AM pk hr | 11      | 14   | 12 | 34  | 46         | 142  | 15 | 21  | 17      | 82   | 54 | 34  | 20         | 94   | 24 | 20  | 531   |
| PM pk hr | 34      | 60   | 35 | 133 | 38         | 72   | 26 | 80  | 43      | 79   | 52 | 111 | 43         | 110  | 19 | 102 | 611   |

## AM Peak Hour

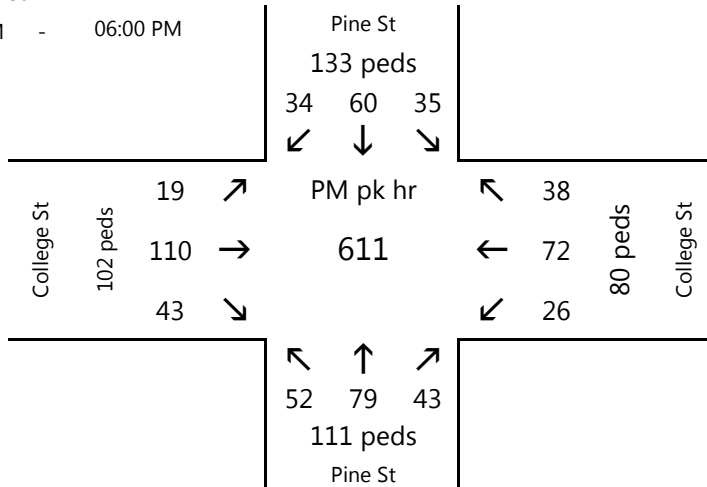
08:00 AM - 09:00 AM



% Auto: 83.0%  
 % Med: 0.0%  
 % Heavy: 0.0%  
 total % Trucks: 0.0%

## PM Peak Hour

05:00 PM - 06:00 PM



% Auto: 58.1%  
 % Med: 0.8%  
 % Heavy: 0.0%  
 total % Trucks: 0.8%

FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403275  
 Community: BURLINGTON  
 Road 1: PINE ST  
 Road 2: MAIN ST

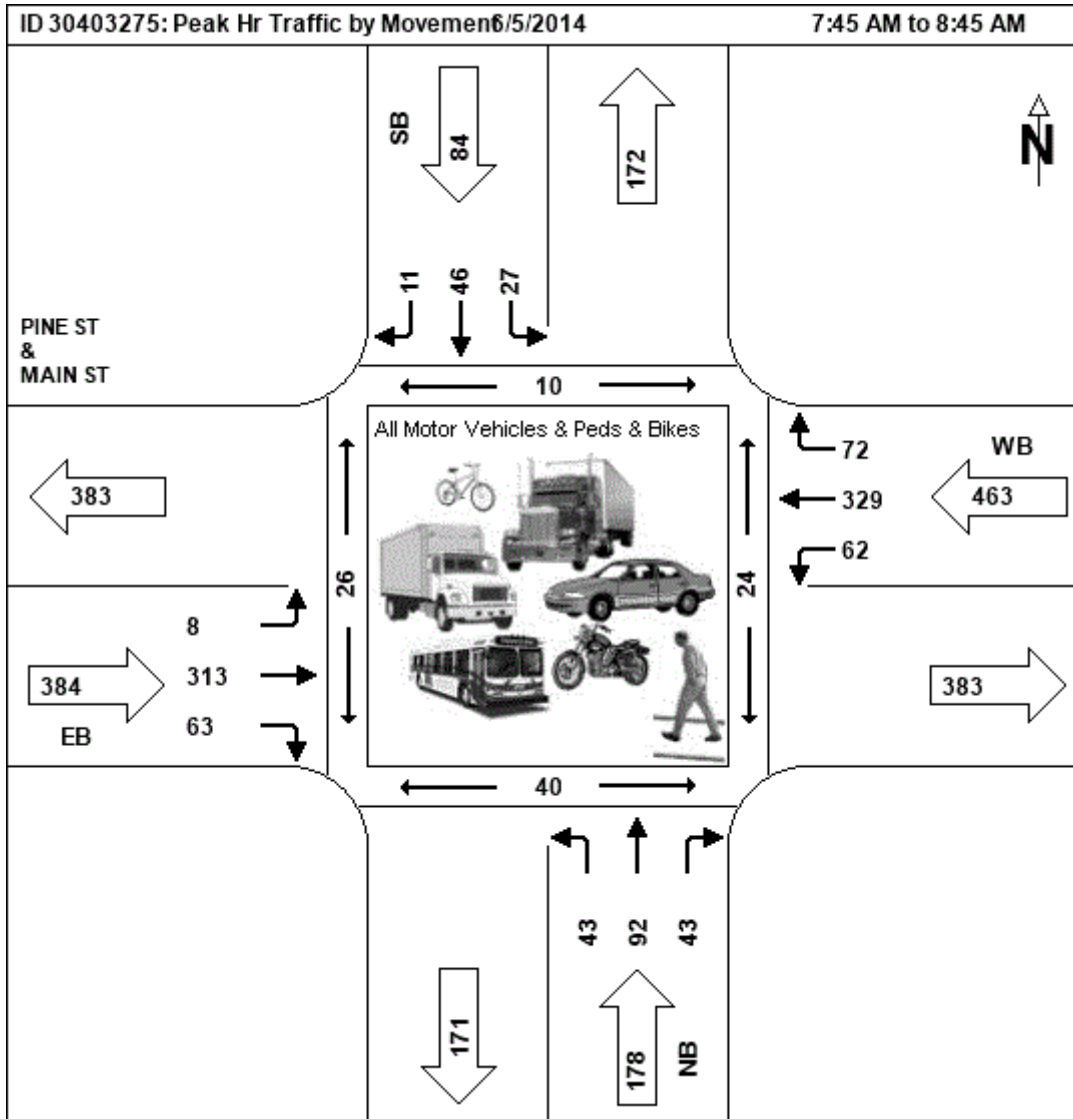
Corridor: NA  
 Road 3: PINE ST  
 Road 4: MAIN ST

|<<|<|>|>>| 1-5 of 5

**AM Peak Hour**  
**06/05/2014**

| NB      |      |      |       |     | EB    |      |      |       |     | SB    |      |      |       |     | WB    |      |      |       |     | App   | Int   |
|---------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|-------|
| Start   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Int   |
| Time    |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total | Total |
| 7:45 AM | 11   | 26   | 10    | 7   | 47    | 1    | 73   | 17    | 4   | 91    | 6    | 11   | 2     | 3   | 19    | 18   | 73   | 21    | 3   | 112   | 269   |
| 8:00 AM | 11   | 19   | 9     | 4   | 39    | 3    | 91   | 19    | 5   | 113   | 3    | 14   | 1     | 3   | 18    | 12   | 89   | 18    | 1   | 119   | 289   |
| 8:15 AM | 13   | 26   | 13    | 5   | 52    | 2    | 70   | 14    | 13  | 86    | 10   | 10   | 4     | 11  | 24    | 20   | 81   | 19    | 6   | 120   | 282   |
| 8:30 AM | 8    | 21   | 11    | 8   | 40    | 2    | 79   | 13    | 18  | 94    | 8    | 11   | 4     | 9   | 23    | 12   | 86   | 14    | 0   | 112   | 269   |
| Total   | 43   | 92   | 43    | 24  | 178   | 8    | 313  | 63    | 40  | 384   | 27   | 46   | 11    | 26  | 84    | 62   | 329  | 72    | 10  | 463   | 1109  |
| PHF     | 0.83 | 0.88 | 0.83  |     | 0.86  | 0.67 | 0.86 | 0.83  |     | 0.85  | 0.68 | 0.82 | 0.69  |     | 0.88  | 0.78 | 0.92 | 0.86  |     | 0.96  |       |
| HV %    | 12   | 7    | 21    |     |       | 0    | 6    | 10    |     |       | 4    | 20   | 9     |     |       | 5    | 6    | 4     |     |       |       |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

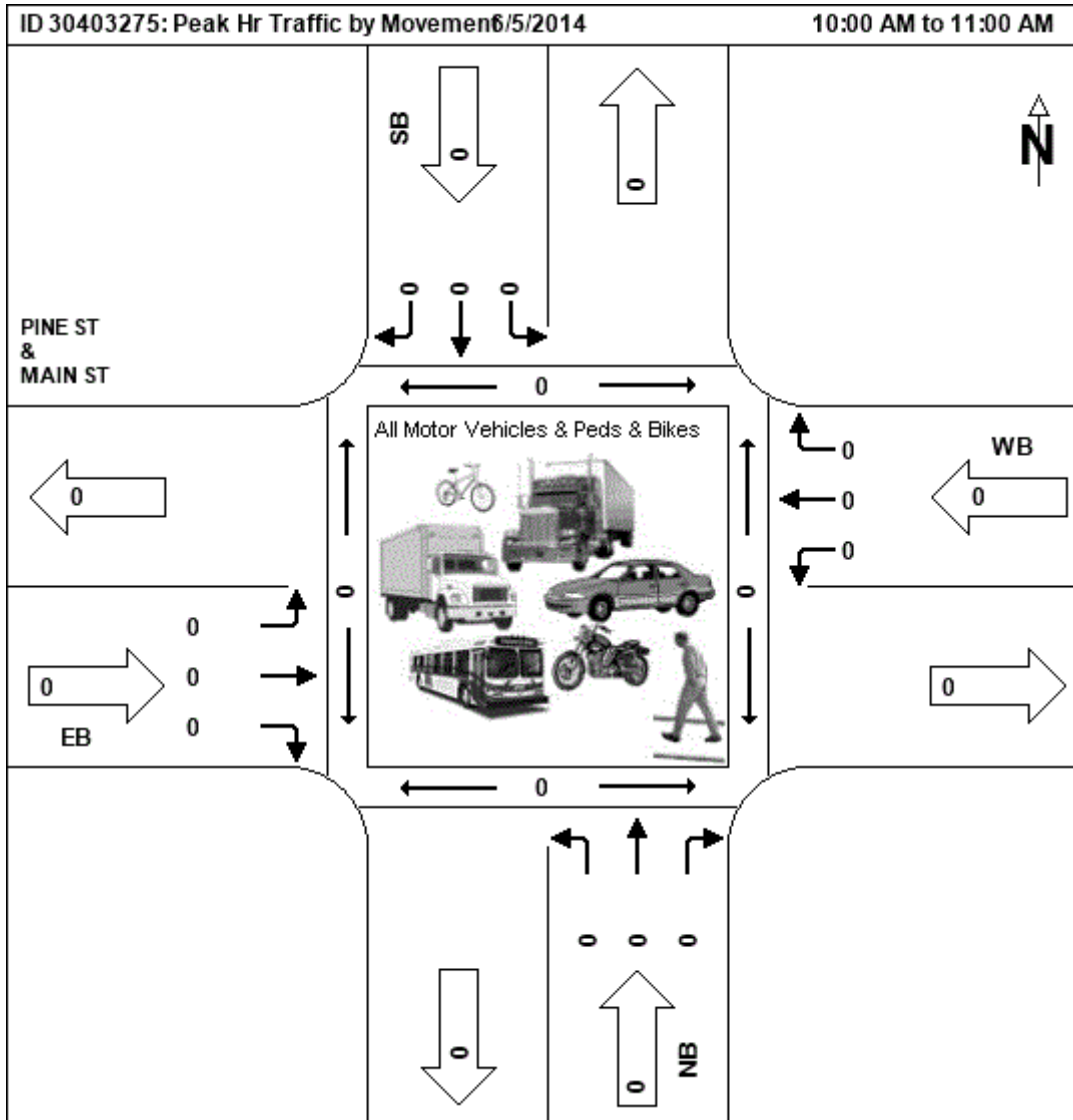


**Midday Peak Hour**  
**06/05/2014**

| NB       |      |      |       |     | EB    |      |      |       |     | SB    |      |      |       |     | WB    |      |      |       |     | App   | Int   |
|----------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|-------|
| Start    | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Int   |
| Time     |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total | Total |
| 10:00 AM | 0    | 0    | 0     | 0   | 0     | 0    | 0    | 0     | 0   | 0     | 0    | 0    | 0     | 0   | 0     | 0    | 0    | 0     | 0   | 0     | 0     |

FIGURE 5-A1

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/05/2014**

| NB         |       |      |       |     |           | EB    |      |       |     |           |       | SB   |       |     |           |       |      | WB    |     |           |           |  |  |
|------------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|-----------|--|--|
| Start Time | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Int Total |  |  |
| 4:30 PM    | 13    | 13   | 12    | 14  | 38        | 0     | 78   | 19    | 12  | 97        | 25    | 44   | 4     | 19  | 73        | 8     | 68   | 11    | 4   | 87        | 295       |  |  |
| 4:45 PM    | 10    | 18   | 9     | 24  | 37        | 1     | 62   | 15    | 15  | 98        | 12    | 23   | 7     | 39  | 42        | 16    | 84   | 12    | 5   | 112       | 269       |  |  |
| 5:00 PM    | 11    | 24   | 11    | 25  | 46        | 8     | 67   | 13    | 20  | 88        | 28    | 40   | 1     | 44  | 69        | 18    | 92   | 11    | 10  | 121       | 324       |  |  |
| 5:15 PM    | 10    | 10   | 11    | 14  | 31        | 3     | 69   | 20    | 17  | 92        | 17    | 36   | 5     | 38  | 58        | 16    | 103  | 11    | 2   | 130       | 311       |  |  |
| Total      | 44    | 65   | 43    | 77  | 152       | 12    | 276  | 67    | 64  | 355       | 82    | 143  | 17    | 140 | 242       | 58    | 347  | 45    | 21  | 450       | 1199      |  |  |
| PHF        | 0.850 | 0.68 | 0.90  |     | 0.83      | 0.380 | 0.88 | 0.84  |     | 0.910     | 0.730 | 0.81 | 0.61  |     | 0.830     | 0.810 | 0.84 | 0.94  |     | 0.87      |           |  |  |
| HV %       | 20    | 3    | 0     |     |           | 0     | 4    | 0     |     |           | 1     | 1    | 6     |     |           | 7     | 4    | 2     |     |           |           |  |  |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



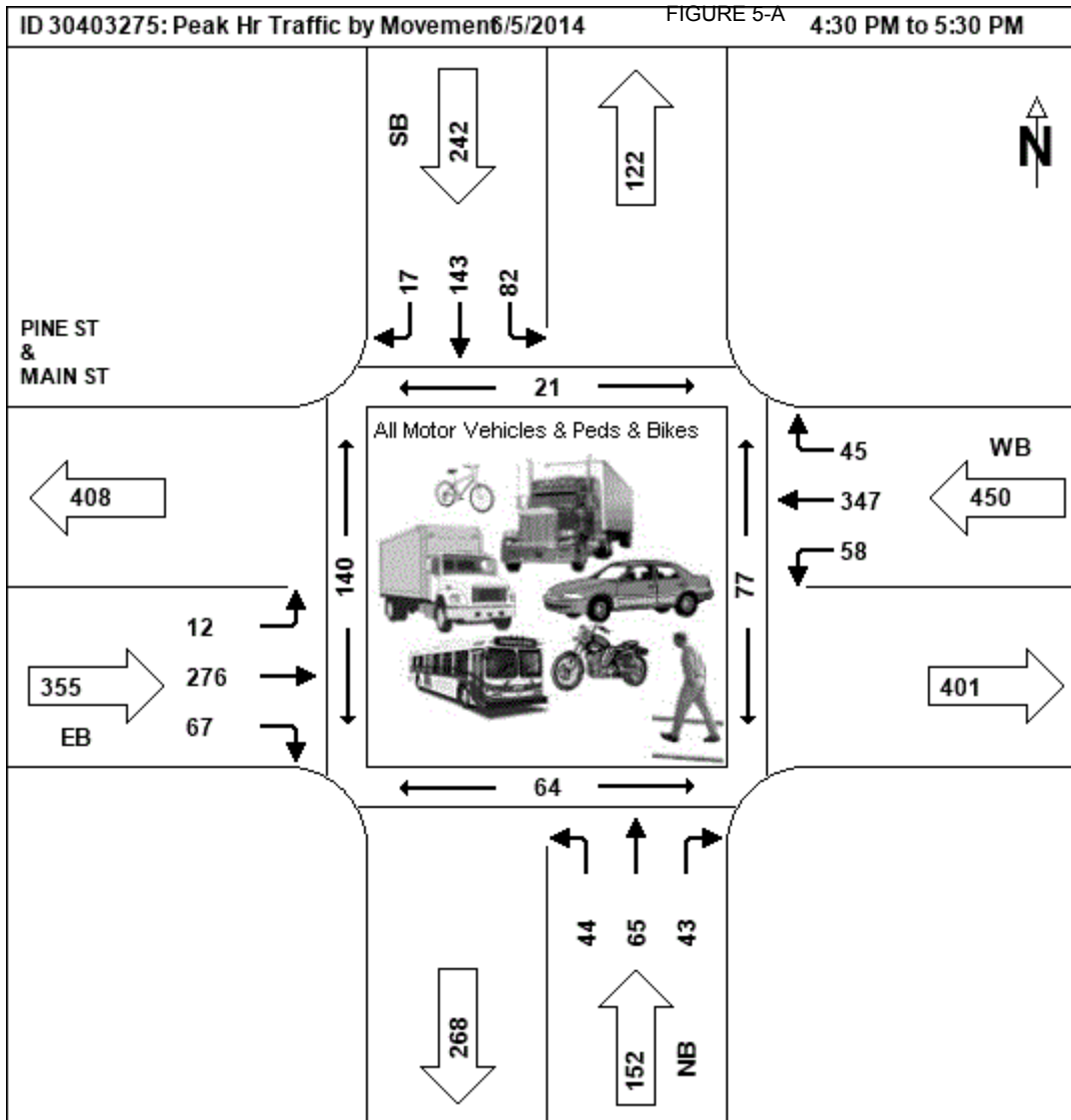


FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403270  
 Community: BURLINGTON  
 Road 1: ST PAUL ST  
 Road 2: MAIN ST

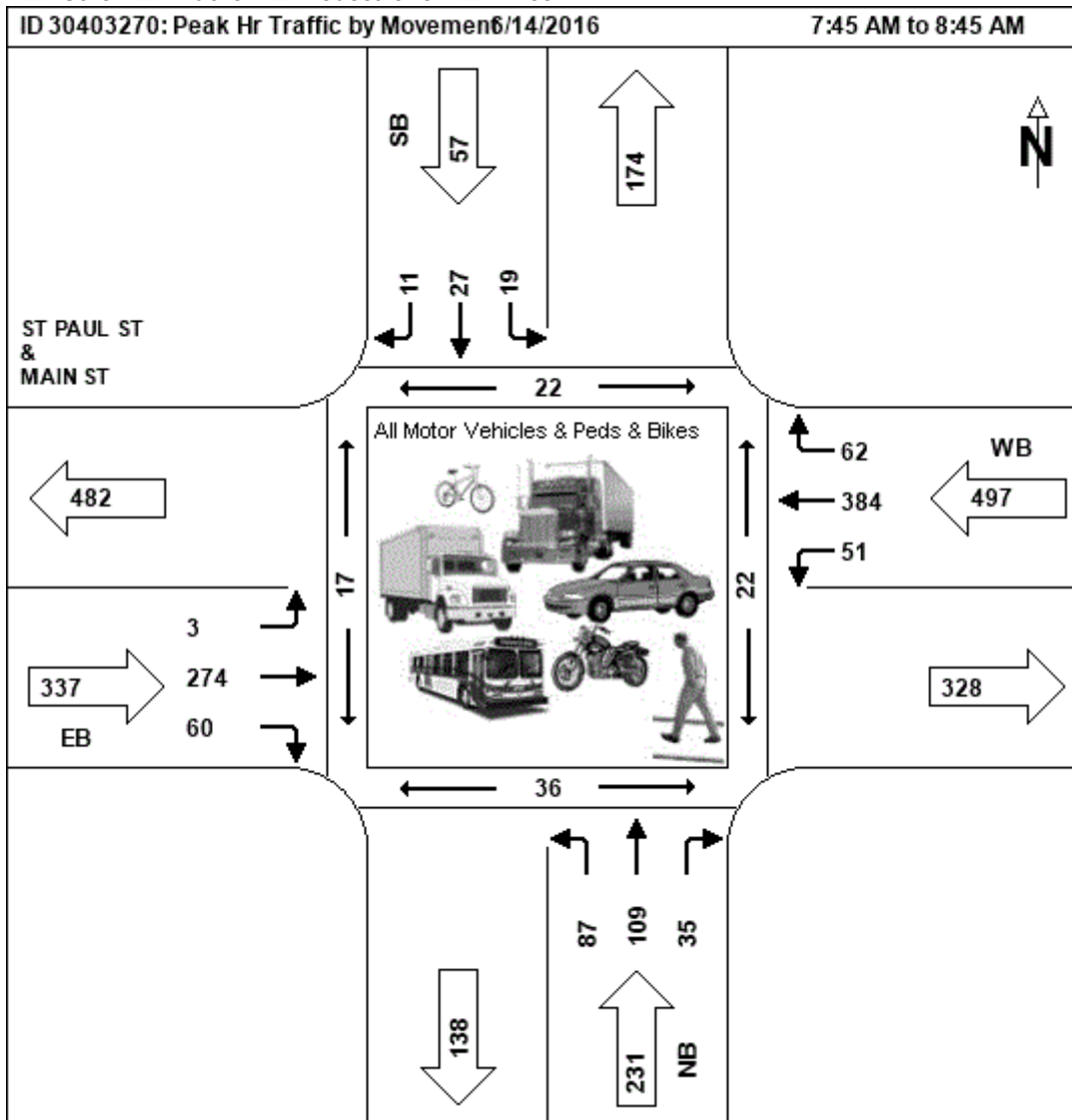
Corridor: NA  
 Road 3: ST PAUL ST  
 Road 4: MAIN ST

|<<|<|>|>>| 1-4 of 4

**AM Peak Hour**  
**06/14/2016**

| NB      |      |      |       |     | EB    |      |      |       |     | SB    |      |      |       |     | WB    |      |      |       |     | App   | Int   |
|---------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|-------|
| Start   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Int   |
| Time    |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total | Total |
| 7:45 AM | 25   | 21   | 5     | 3   | 51    | 1    | 80   | 19    | 4   | 100   | 7    | 4    | 1     | 5   | 12    | 13   | 101  | 16    | 1   | 130   | 293   |
| 8:00 AM | 20   | 39   | 11    | 10  | 70    | 0    | 70   | 21    | 7   | 91    | 6    | 6    | 0     | 4   | 12    | 15   | 90   | 11    | 7   | 116   | 289   |
| 8:15 AM | 18   | 26   | 9     | 6   | 53    | 2    | 62   | 13    | 9   | 77    | 2    | 10   | 4     | 2   | 16    | 9    | 98   | 17    | 11  | 124   | 270   |
| 8:30 AM | 24   | 23   | 10    | 3   | 57    | 0    | 62   | 7     | 16  | 69    | 4    | 7    | 6     | 6   | 17    | 14   | 95   | 18    | 3   | 127   | 270   |
| Total   | 87   | 109  | 35    | 22  | 231   | 3    | 274  | 60    | 36  | 337   | 19   | 27   | 11    | 17  | 57    | 51   | 384  | 62    | 22  | 497   | 1122  |
| PHF     | 0.87 | 0.70 | 0.80  |     | 0.83  | 0.38 | 0.86 | 0.71  |     | 0.84  | 0.68 | 0.68 | 0.46  |     | 0.84  | 0.85 | 0.95 | 0.86  |     | 0.96  |       |
| HV %    | 7    | 2    | 6     |     |       | 33   | 7    | 0     |     |       | 5    | 4    | 0     |     |       | 10   | 5    | 0     |     |       |       |

☒ Cars 
 ☒ Trucks 
 ☒ Pedestrians 
 ☒ Bikes

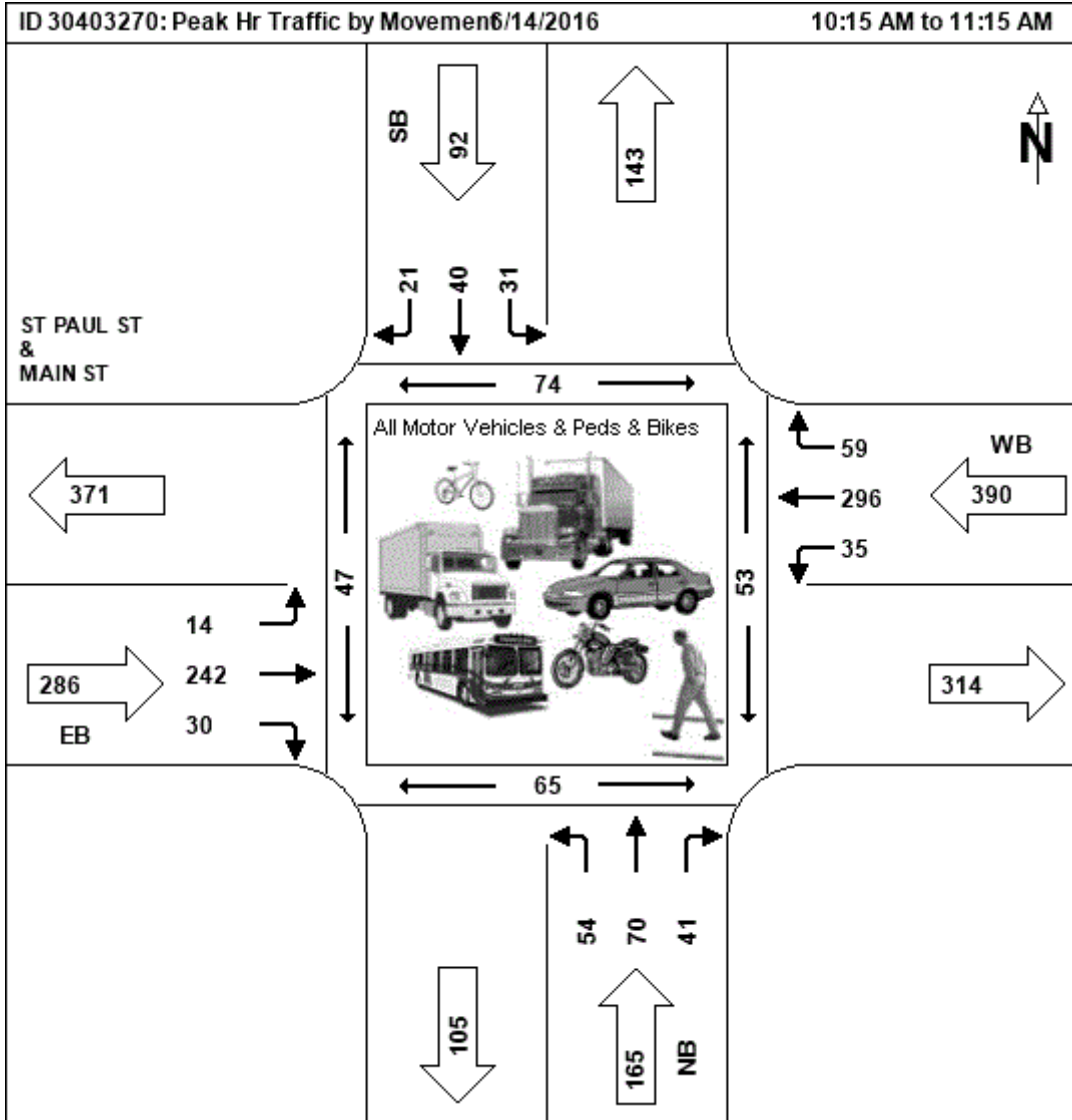


**Midday Peak Hour**  
**06/14/2016**

| NB       |      |      |       |     | EB    |      |      |       |     | SB    |      |      |       |     | WB    |      |      |       |     | App   | Int   |
|----------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|------|------|-------|-----|-------|-------|
| Start    | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Left | Thru | Right | Ped | App   | Int   |
| Time     |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total |      |      |       |     | Total | Total |
| 10:15 AM | 18   | 16   | 9     | 10  | 43    | 0    | 72   | 8     | 15  | 80    | 8    | 9    | 8     | 15  | 25    | 16   | 68   | 18    | 14  | 102   | 250   |

|          |      |      |      |    |      |      |      |      |    |      |      |      |           |    |      |      |      |      |    |      |     |     |
|----------|------|------|------|----|------|------|------|------|----|------|------|------|-----------|----|------|------|------|------|----|------|-----|-----|
| 10:30 AM | 14   | 9    | 12   | 10 | 35   | 4    | 57   | 7    | 19 | 68   | 8    | 9    | FIGURE 5A |    |      |      | 5    | 82   | 14 | 20   | 101 | 224 |
| 10:45 AM | 8    | 24   | 9    | 15 | 41   | 3    | 51   | 4    | 14 | 58   | 7    | 13   | 4         | 8  | 24   | 8    | 73   | 15   | 23 | 96   | 219 |     |
| 11:00 AM | 14   | 21   | 11   | 18 | 46   | 7    | 62   | 11   | 17 | 80   | 8    | 9    | 6         | 13 | 23   | 6    | 73   | 12   | 17 | 91   | 240 |     |
| Total    | 54   | 70   | 41   | 53 | 165  | 14   | 242  | 30   | 65 | 286  | 31   | 40   | 21        | 47 | 92   | 35   | 296  | 59   | 74 | 390  | 933 |     |
| PHF      | 0.75 | 0.73 | 0.85 |    | 0.90 | 0.50 | 0.84 | 0.68 |    | 0.89 | 0.97 | 0.77 | 0.66      |    | 0.92 | 0.55 | 0.90 | 0.82 |    | 0.96 |     |     |
| HV %     | 7    | 4    | 7    |    |      | 0    | 3    | 3    |    |      | 10   | 5    | 5         |    | 6    | 6    | 8    |      |    |      |     |     |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/13/2016**

| NB         |      |      |       |     |           | EB   |      |       |     |           | SB   |      |       |     |           | WB   |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:30 PM    | 21   | 28   | 12    | 11  | 61        | 7    | 70   | 17    | 16  | 94        | 14   | 31   | 6     | 14  | 51        | 12   | 81   | 11    | 10  | 104       | 310       |
| 4:45 PM    | 22   | 13   | 21    | 11  | 56        | 3    | 78   | 23    | 25  | 104       | 16   | 22   | 1     | 20  | 39        | 11   | 67   | 10    | 12  | 88        | 287       |
| 5:00 PM    | 21   | 12   | 19    | 25  | 52        | 2    | 107  | 21    | 39  | 130       | 14   | 30   | 2     | 16  | 46        | 19   | 83   | 11    | 36  | 113       | 341       |
| 5:15 PM    | 23   | 17   | 7     | 11  | 47        | 2    | 71   | 14    | 35  | 87        | 15   | 19   | 3     | 14  | 37        | 12   | 86   | 17    | 20  | 115       | 286       |
| Total      | 87   | 70   | 59    | 58  | 216       | 14   | 326  | 75    | 115 | 415       | 59   | 102  | 12    | 64  | 173       | 54   | 317  | 49    | 78  | 420       | 1224      |
| PHF        | 0.95 | 0.63 | 0.70  |     | 0.89      | 0.50 | 0.76 | 0.82  |     | 0.80      | 0.92 | 0.82 | 0.50  |     | 0.85      | 0.71 | 0.92 | 0.72  |     | 0.91      |           |
| HV %       | 8    | 0    | 0     |     |           | 0    | 2    | 5     |     |           | 2    | 2    | 0     |     |           | 0    | 2    | 2     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



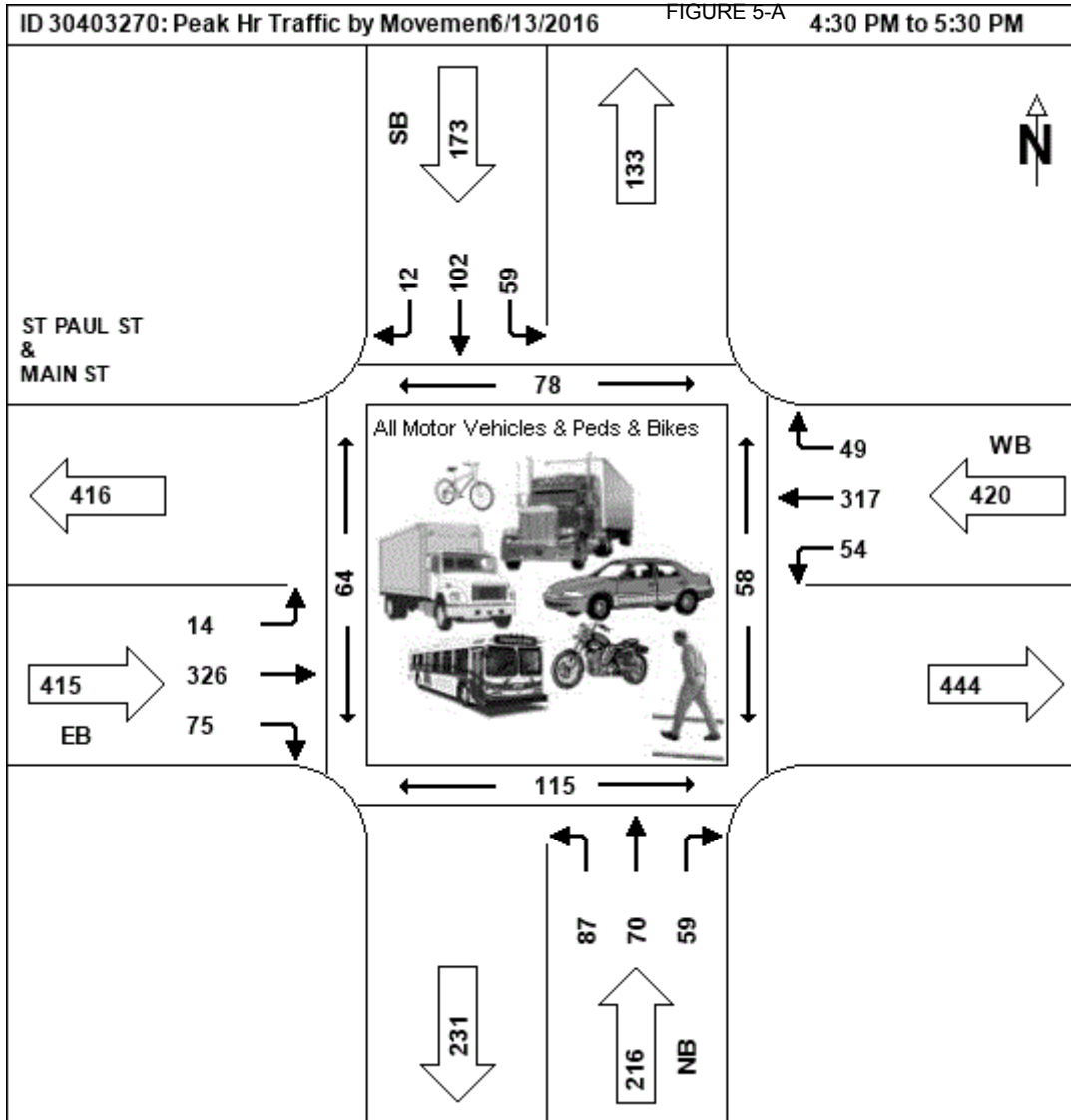


FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403615  
 Community: BURLINGTON  
 Road 1: ALT-7  
 Road 2: MAIN ST

Corridor: NA  
 Road 3: ALT-7  
 Road 4: MAIN ST

|<<|<|>|>>| 1-5 of 5

### AM Peak Hour 06/15/2016

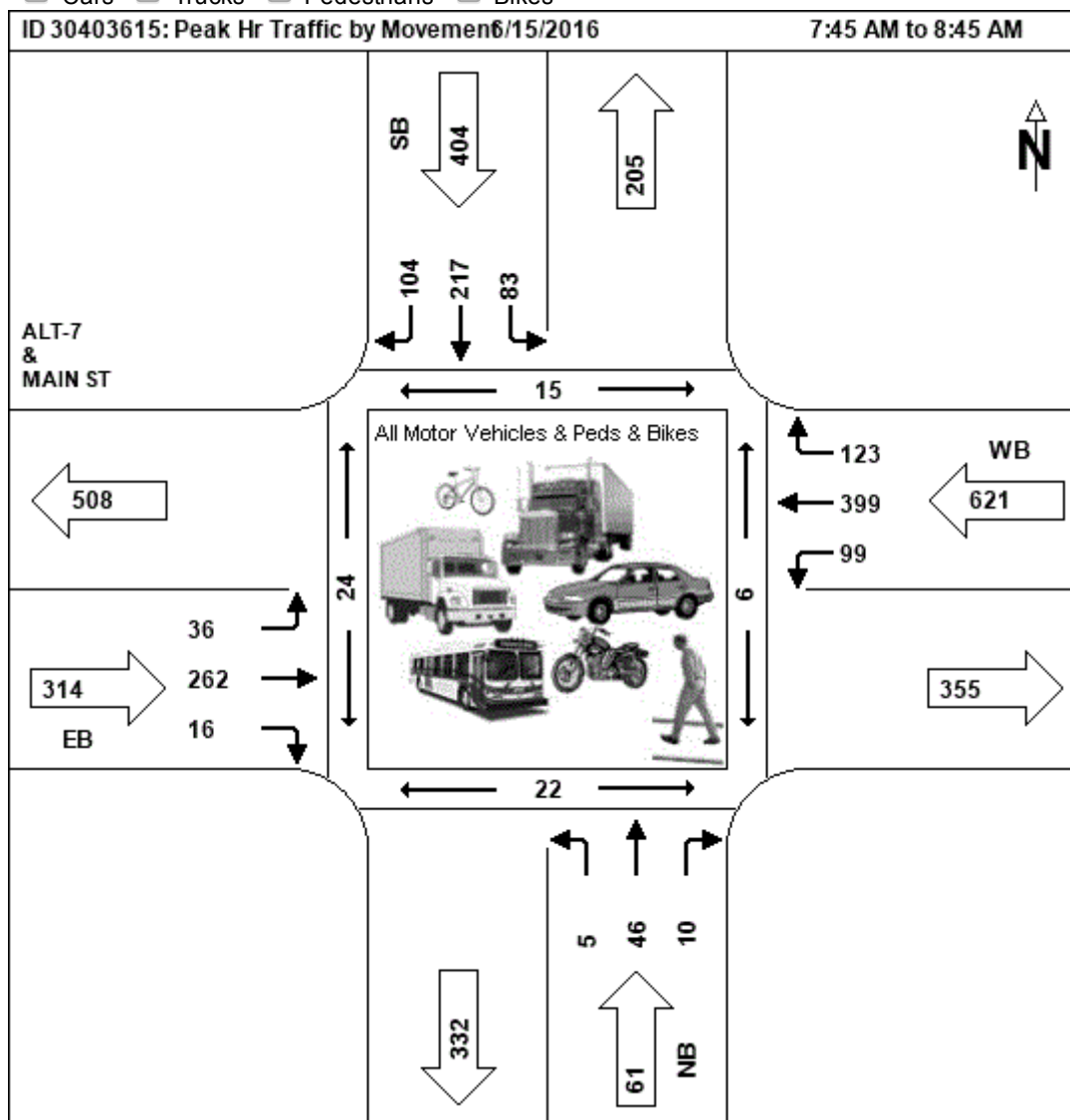
| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 7:45 AM    | 1    | 7    | 4     | 0   | 12        | 9    | 80   | 3     | 3   | 92        | 20   | 58   | 18    | 4   | 96        | 28   | 97   | 29    | 3   | 154       | 354       |
| 8:00 AM    | 0    | 13   | 3     | 4   | 16        | 2    | 59   | 4     | 11  | 65        | 18   | 43   | 19    | 7   | 80        | 32   | 98   | 25    | 5   | 155       | 316       |
| 8:15 AM    | 3    | 10   | 1     | 1   | 14        | 11   | 58   | 5     | 5   | 74        | 21   | 55   | 28    | 4   | 104       | 25   | 110  | 37    | 1   | 172       | 364       |
| 8:30 AM    | 1    | 16   | 2     | 1   | 19        | 14   | 65   | 4     | 3   | 83        | 24   | 61   | 39    | 9   | 124       | 14   | 94   | 32    | 6   | 140       | 366       |
| Total      | 5    | 46   | 10    | 6   | 61        | 36   | 262  | 16    | 22  | 314       | 83   | 217  | 104   | 24  | 404       | 99   | 399  | 123   | 15  | 621       | 1400      |
| PHF        | 0.42 | 0.72 | 0.63  |     | 0.80      | 0.64 | 0.82 | 0.80  |     | 0.85      | 0.86 | 0.89 | 0.67  |     | 0.81      | 0.77 | 0.91 | 0.83  |     | 0.90      |           |
| HV %       | 0    | 0    | 0     |     |           | 6    | 5    | 0     |     |           | 13   | 7    | 3     |     |           | 1    | 4    | 4     |     |           |           |

☒ Cars

☒ Trucks

☒ Pedestrians

☒ Bikes



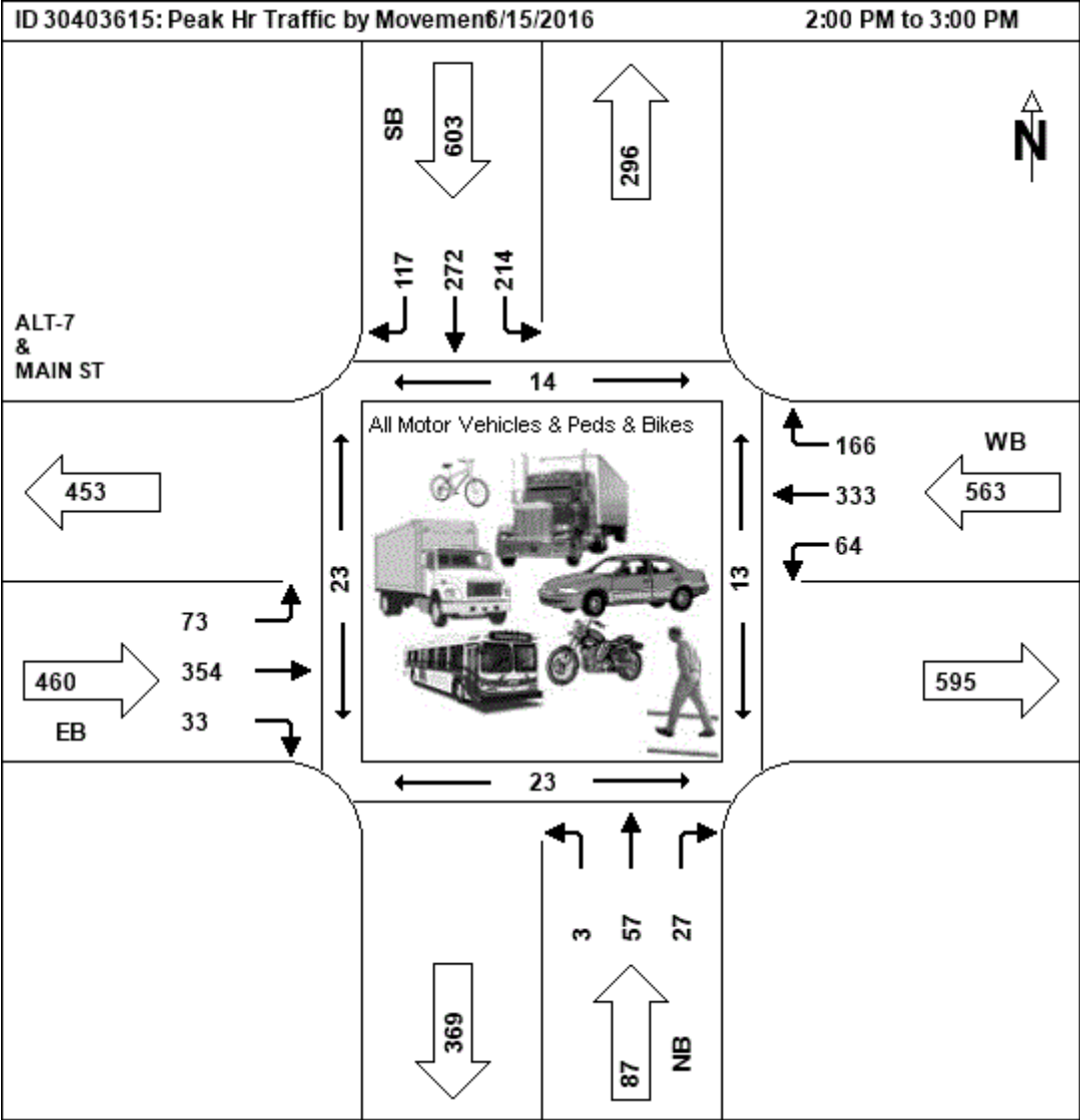
### Midday Peak Hour 06/15/2016

06/16/2016

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 2:00 PM    | 0    | 19   | 7     | 4   | 26        | 11   | 96   | 9     | 7   | 116       | 59   | 72   | 31    | 0   | 162       | 21   | 78   | 32    | 1   | 131       | 435       |

|         |      |      |      |    |      |      |      |      |    |      |      |      |      |    |      |      |      |      |     |      |      |
|---------|------|------|------|----|------|------|------|------|----|------|------|------|------|----|------|------|------|------|-----|------|------|
| 2:15 PM | 1    | 14   | 8    | 3  | 23   | 19   | 84   | 12   | 9  | 115  | 42   | 59   | 26   | 7  | 81   | 50   | 5    | 138  | 403 |      |      |
| 2:30 PM | 2    | 11   | 9    | 2  | 22   | 23   | 89   | 6    | 5  | 118  | 56   | 69   | 21   | 8  | 146  | 9    | 90   | 42   | 5   | 141  | 427  |
| 2:45 PM | 0    | 13   | 3    | 4  | 16   | 20   | 85   | 6    | 2  | 111  | 57   | 72   | 39   | 5  | 168  | 27   | 84   | 42   | 3   | 153  | 448  |
| Total   | 3    | 57   | 27   | 13 | 87   | 73   | 354  | 33   | 23 | 460  | 214  | 272  | 117  | 23 | 603  | 64   | 333  | 166  | 14  | 563  | 1713 |
| PHF     | 0.38 | 0.75 | 0.75 |    | 0.84 | 0.79 | 0.92 | 0.69 |    | 0.97 | 0.91 | 0.94 | 0.75 |    | 0.90 | 0.59 | 0.93 | 0.83 |     | 0.92 |      |
| HV %    | 0    | 2    | 0    |    |      | 3    | 4    | 0    |    |      | 3    | 6    | 9    |    |      | 0    | 3    | 2    |     |      |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



PM Peak Hour  
06/15/2016

| NB                                                                                                                                                                                       |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time                                                                                                                                                                               | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:45 PM                                                                                                                                                                                  | 1    | 30   | 12    | 2   | 43        | 19   | 101  | 11    | 0   | 131       | 59   | 85   | 38    | 0   | 182       | 11   | 92   | 44    | 10  | 147       | 503       |
| 5:00 PM                                                                                                                                                                                  | 1    | 31   | 15    | 6   | 47        | 21   | 111  | 8     | 8   | 140       | 70   | 79   | 20    | 0   | 169       | 23   | 118  | 48    | 4   | 189       | 545       |
| 5:15 PM                                                                                                                                                                                  | 2    | 31   | 4     | 6   | 37        | 21   | 98   | 7     | 5   | 126       | 64   | 84   | 25    | 3   | 173       | 26   | 109  | 21    | 6   | 156       | 492       |
| 5:30 PM                                                                                                                                                                                  | 2    | 20   | 11    | 5   | 33        | 21   | 93   | 10    | 7   | 124       | 46   | 81   | 18    | 0   | 145       | 22   | 114  | 35    | 11  | 171       | 473       |
| Total                                                                                                                                                                                    | 6    | 112  | 42    | 19  | 160       | 82   | 403  | 36    | 20  | 521       | 239  | 329  | 101   | 3   | 669       | 82   | 433  | 148   | 31  | 663       | 2013      |
| PHF                                                                                                                                                                                      | 0.75 | 0.90 | 0.70  |     | 0.85      | 0.98 | 0.91 | 0.82  |     | 0.93      | 0.85 | 0.97 | 0.66  |     | 0.92      | 0.79 | 0.92 | 0.77  |     | 0.88      |           |
| HV %                                                                                                                                                                                     | 0    | 0    | 5     |     |           | 2    | 0    | 0     |     |           | 3    | 2    | 2     |     |           | 0    | 2    | 0     |     |           |           |
| <div><input checked="" type="checkbox"/> Cars <input checked="" type="checkbox"/> Trucks <input checked="" type="checkbox"/> Pedestrians <input checked="" type="checkbox"/> Bikes</div> |      |      |       |     |           |      |      |       |     |           |      |      |       |     |           |      |      |       |     |           |           |



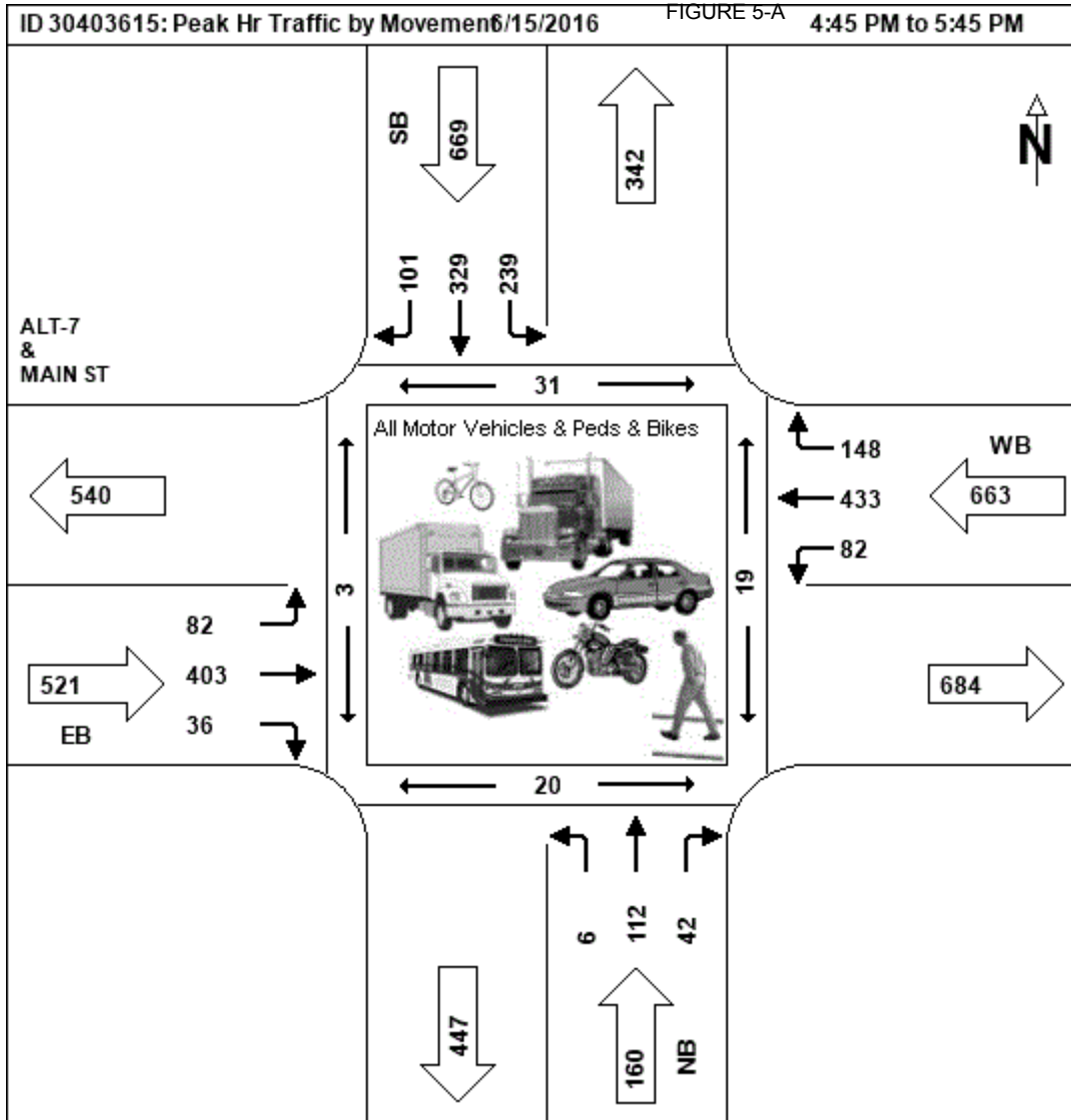


FIGURE 5-A

## Peak Hour Data for Intersection

Int ID: 30403265  
 Community: BURLINGTON  
 Road 1: S UNION ST  
 Road 2: MAIN ST

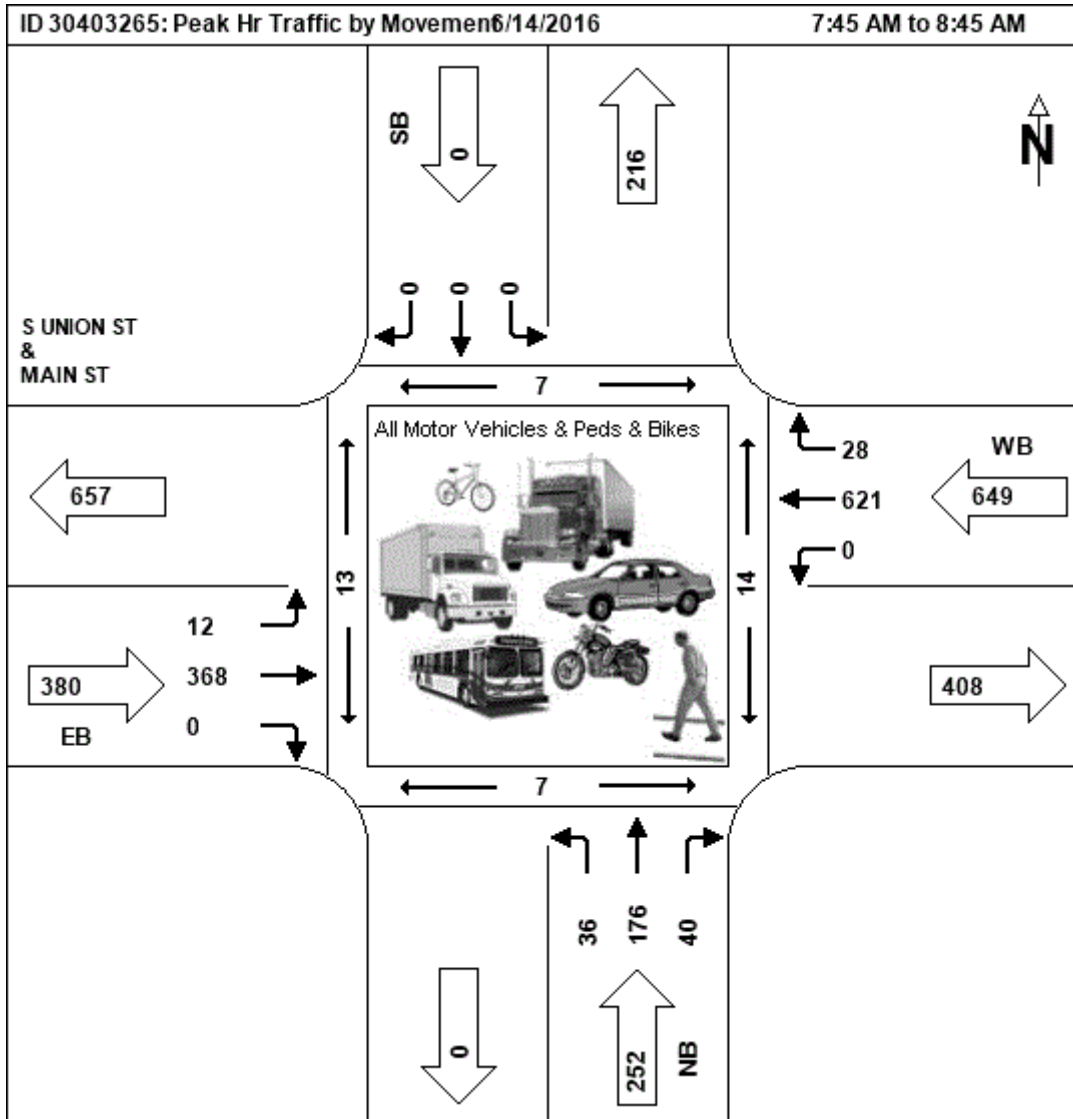
Corridor: NA  
 Road 3: S UNION ST  
 Road 4: MAIN ST

|<<|<|>|>>| 1-6 of 6

### AM Peak Hour 06/14/2016

| NB         |       |      |       |     | EB        |       |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|-------|------|-------|-----|-----------|-------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left  | Thru | Right | Ped | App Total | Left  | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 7:45 AM    | 3     | 46   | 5     | 7   | 54        | 6     | 112  | 0     | 2   | 118       | 0    | 0    | 0     | 7   | 0         | 0    | 166  | 4     | 0   | 170       | 342       |
| 8:00 AM    | 6     | 41   | 14    | 4   | 61        | 1     | 87   | 0     | 1   | 88        | 0    | 0    | 0     | 1   | 0         | 0    | 158  | 4     | 3   | 162       | 311       |
| 8:15 AM    | 19    | 50   | 11    | 2   | 80        | 2     | 88   | 0     | 1   | 90        | 0    | 0    | 0     | 1   | 0         | 0    | 141  | 12    | 2   | 153       | 323       |
| 8:30 AM    | 8     | 39   | 10    | 1   | 57        | 3     | 81   | 0     | 3   | 84        | 0    | 0    | 0     | 4   | 0         | 0    | 156  | 8     | 2   | 164       | 305       |
| Total      | 36    | 176  | 40    | 14  | 252       | 12    | 368  | 0     | 7   | 380       | 0    | 0    | 0     | 13  | 0         | 0    | 621  | 28    | 7   | 649       | 1281      |
| PHF        | 0.470 | 0.88 | 0.71  |     | 0.79      | 0.500 | 0.82 |       |     | 0.81      |      |      |       |     |           |      | 0.94 | 0.58  |     | 0.95      |           |
| HV %       | 11    | 2    | 3     |     |           | 17    | 7    |       |     |           |      |      |       |     |           |      | 4    | 4     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

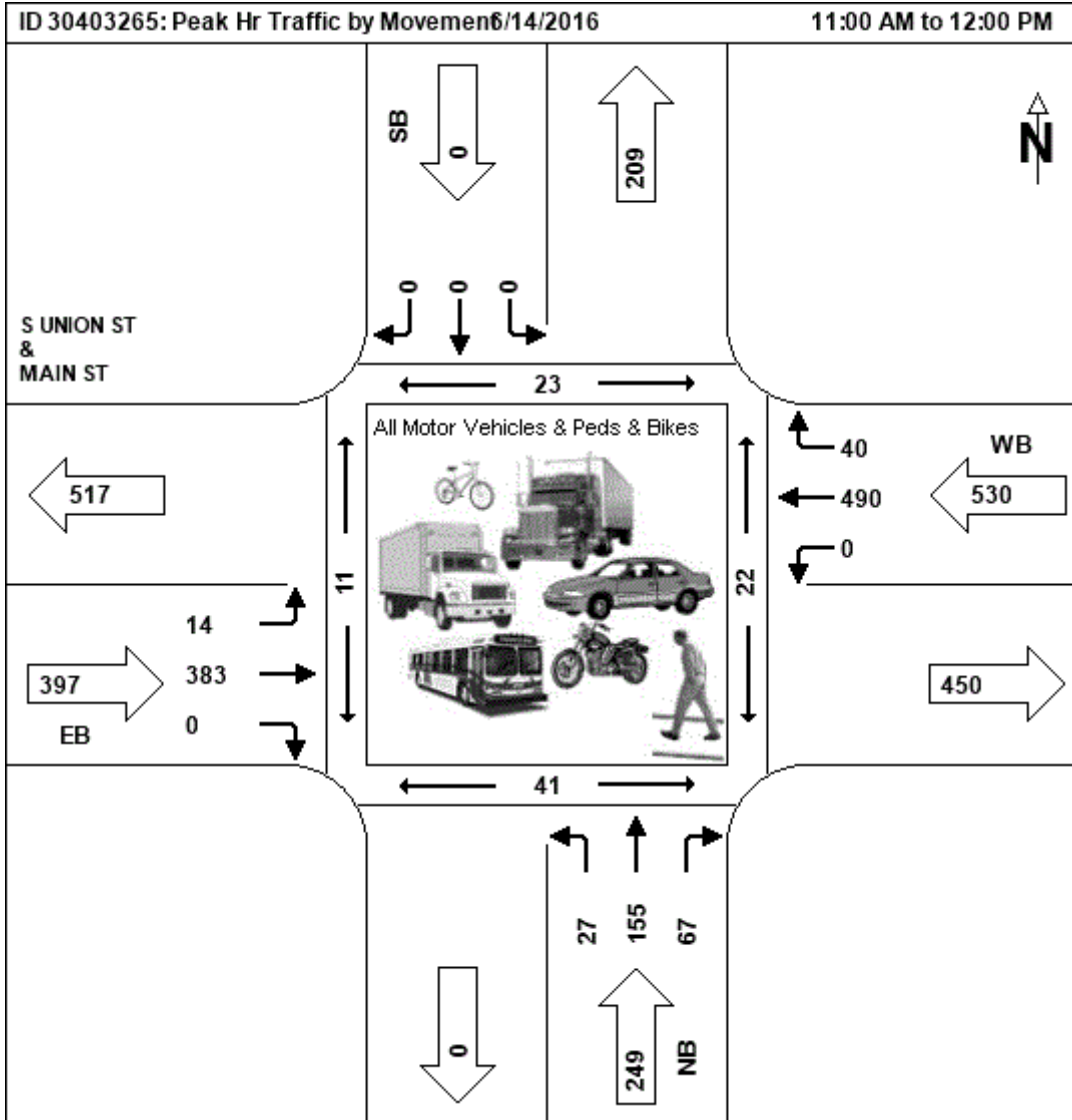


### Midday Peak Hour 06/14/2016

| NB         |      |      |       |     |           | EB   |      |       |     |           |      | SB   |       |     |           |      |      | WB    |     |           |           |  |  |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|--|--|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |  |  |
| 11:00 AM   | 5    | 28   | 13    | 3   | 46        | 4    | 80   | 0     | 9   | 84        | 0    | 0    | 0     | 2   | 0         | 0    | 119  | 10    | 5   | 129       | 259       |  |  |

|          |    |       |      |      |     |      |      |      |    |      |   |   |            |    |   |   |      |      |    |      |      |     |
|----------|----|-------|------|------|-----|------|------|------|----|------|---|---|------------|----|---|---|------|------|----|------|------|-----|
| 11:15 AM | 4  | 53    | 18   | 4    | 75  | 4    | 102  | 0    | 0  | 106  | 0 | 0 | FIGURE 5-A |    |   |   | 0    | 119  | 4  | 0    | 123  | 304 |
| 11:30 AM | 9  | 23    | 23   | 1    | 55  | 1    | 97   | 0    | 28 | 98   | 0 | 0 | 0          | 4  | 0 | 0 | 107  | 10   | 7  | 117  | 270  |     |
| 11:45 AM | 9  | 51    | 13   | 14   | 73  | 5    | 104  | 0    | 4  | 109  | 0 | 0 | 0          | 3  | 0 | 0 | 145  | 16   | 11 | 161  | 343  |     |
| Total    | 27 | 155   | 67   | 22   | 249 | 14   | 383  | 0    | 41 | 397  | 0 | 0 | 0          | 11 | 0 | 0 | 490  | 40   | 23 | 530  | 1176 |     |
| PHF      |    | 0.750 | 0.73 | 0.73 |     | 0.83 | 0.70 | 0.92 |    | 0.91 |   |   |            |    |   |   | 0.84 | 0.63 |    | 0.82 |      |     |
| HV %     | 11 | 2     | 3    |      |     | 0    | 7    |      |    |      |   |   |            |    |   |   | 5    | 3    |    |      |      |     |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/13/2016**

| NB         |      |      |       |     |           | EB   |      |       |     |           | SB   |      |       |     |           | WB   |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:30 PM    | 6    | 66   | 23    | 3   | 95        | 12   | 163  | 0     | 3   | 175       | 0    | 0    | 0     | 3   | 0         | 0    | 122  | 5     | 7   | 127       | 397       |
| 4:45 PM    | 13   | 61   | 25    | 2   | 99        | 7    | 175  | 0     | 1   | 182       | 0    | 0    | 0     | 2   | 0         | 0    | 123  | 11    | 4   | 134       | 415       |
| 5:00 PM    | 7    | 57   | 33    | 2   | 97        | 9    | 179  | 0     | 5   | 188       | 0    | 0    | 0     | 3   | 0         | 0    | 148  | 11    | 9   | 159       | 444       |
| 5:15 PM    | 15   | 57   | 16    | 5   | 88        | 13   | 158  | 0     | 5   | 171       | 0    | 0    | 0     | 10  | 0         | 0    | 158  | 5     | 9   | 163       | 422       |
| Total      | 41   | 241  | 97    | 12  | 379       | 41   | 675  | 0     | 14  | 716       | 0    | 0    | 0     | 18  | 0         | 0    | 551  | 32    | 29  | 583       | 1678      |
| PHF        | 0.68 | 0.91 | 0.73  |     | 0.96      | 0.79 | 0.94 |       |     | 0.95      |      |      |       |     |           |      | 0.87 | 0.73  |     | 0.89      |           |
| HV %       | 5    | 2    | 0     |     |           | 0    | 2    |       |     |           |      |      |       |     |           |      | 1    | 0     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



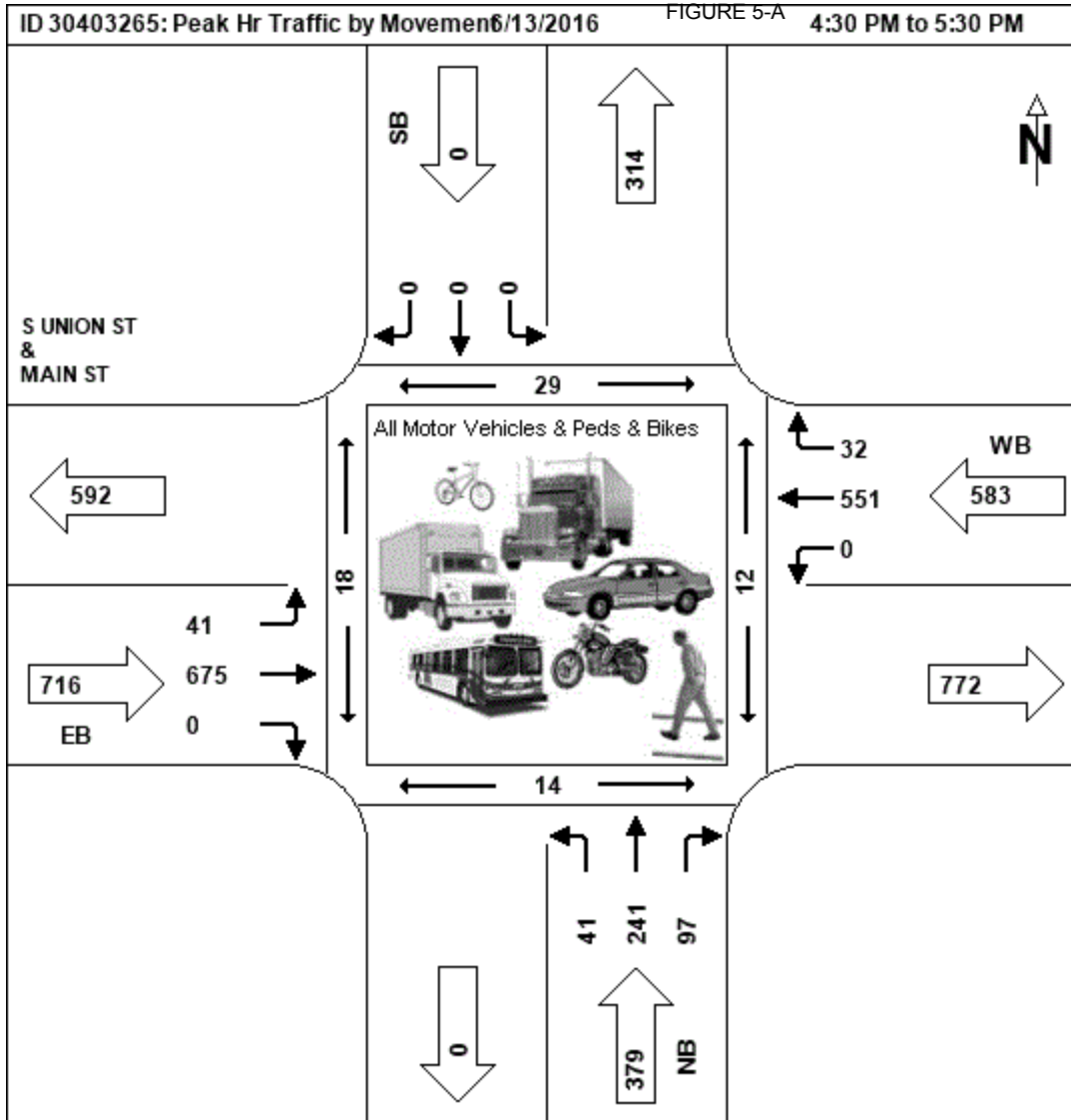


FIGURE 5-A

## Peak Hour Data for Intersection

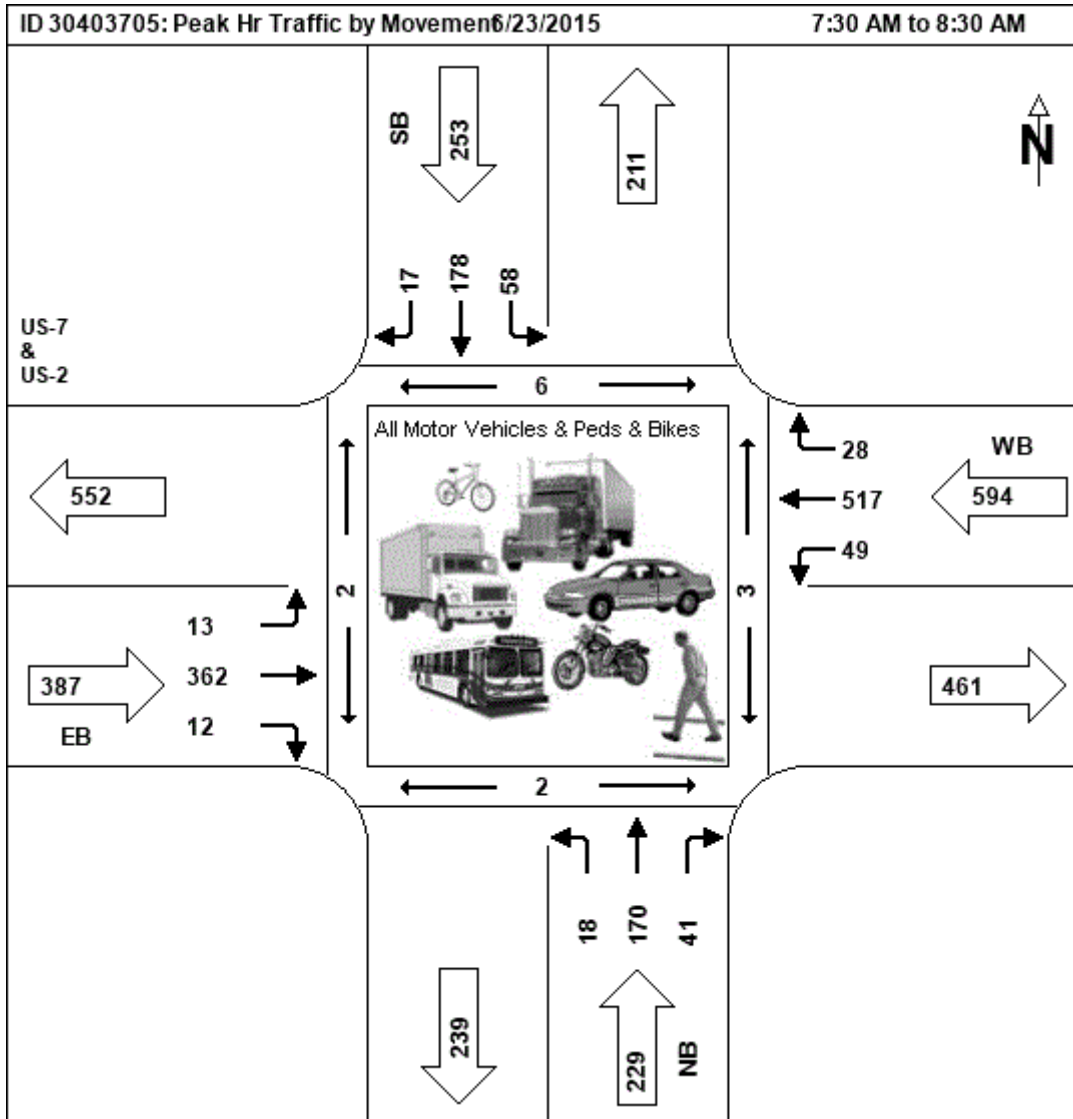
Int ID: 30403705  
 Community: BURLINGTON  
 Road 1: US-7  
 Road 2: US-2

Corridor: NA  
 Road 3: US-7  
 Road 4: MAIN ST

|<<|<|>|>>| 1-8 of 8

**AM Peak Hour**  
**06/23/2015**

| NB                                                                                                                                                                                                                                |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------------|
| Start Time                                                                                                                                                                                                                        | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int. Total |
| 7:30 AM                                                                                                                                                                                                                           | 7    | 43   | 10    | 1   | 60        | 3    | 74   | 3     | 2   | 80        | 13   | 34   | 3     | 0   | 50        | 11   | 99   | 7     | 2   | 117       | 307        |
| 7:45 AM                                                                                                                                                                                                                           | 3    | 44   | 11    | 1   | 58        | 3    | 109  | 3     | 0   | 115       | 18   | 67   | 7     | 2   | 92        | 17   | 155  | 7     | 3   | 179       | 444        |
| 8:00 AM                                                                                                                                                                                                                           | 5    | 46   | 11    | 1   | 62        | 6    | 99   | 3     | 0   | 108       | 13   | 43   | 4     | 0   | 60        | 13   | 144  | 10    | 1   | 167       | 397        |
| 8:15 AM                                                                                                                                                                                                                           | 3    | 37   | 9     | 0   | 49        | 1    | 80   | 3     | 0   | 84        | 14   | 34   | 3     | 0   | 51        | 8    | 119  | 4     | 0   | 131       | 315        |
| Total                                                                                                                                                                                                                             | 18   | 170  | 41    | 3   | 229       | 13   | 362  | 12    | 2   | 387       | 58   | 178  | 17    | 2   | 253       | 49   | 517  | 28    | 6   | 594       | 1463       |
| PHF                                                                                                                                                                                                                               | 0.64 | 0.92 | 0.93  |     | 0.92      | 0.54 | 0.83 | 1.00  |     | 0.84      | 0.81 | 0.66 | 0.61  |     | 0.69      | 0.72 | 0.83 | 0.70  |     | 0.83      |            |
| HV %                                                                                                                                                                                                                              | 11   | 2    | 0     |     |           | 38   | 5    | 17    |     |           | 2    | 0    | 0     |     |           | 2    | 3    | 0     |     |           |            |
| <div><div><input checked="" type="checkbox"/> Cars</div><div><input checked="" type="checkbox"/> Trucks</div><div><input checked="" type="checkbox"/> Pedestrians</div><div><input checked="" type="checkbox"/> Bikes</div></div> |      |      |       |     |           |      |      |       |     |           |      |      |       |     |           |      |      |       |     |           |            |



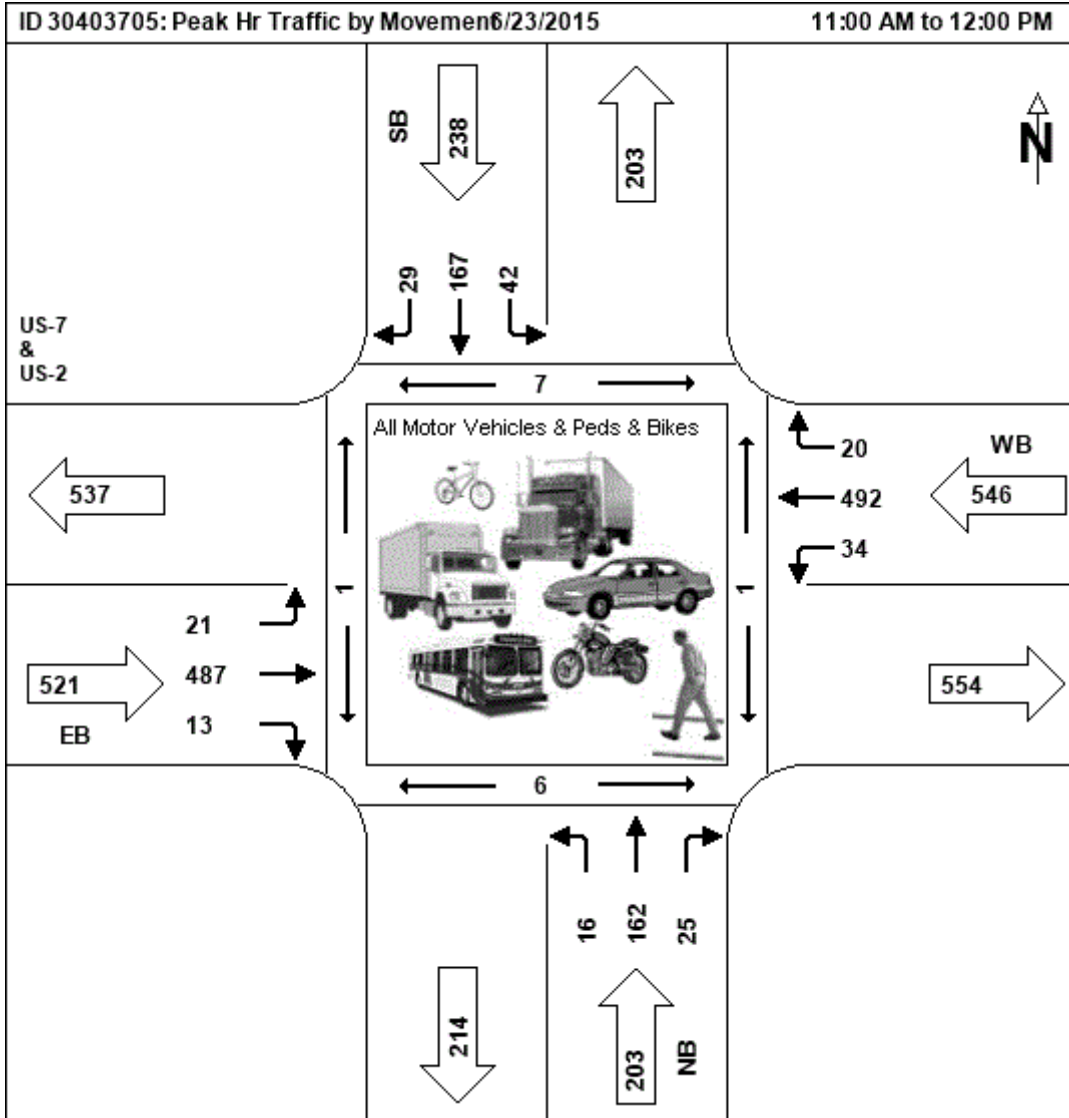
**Midday Peak Hour**  
**06/23/2015**

06/26/2019

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 11:00 AM   | 4    | 39   | 4     | 0   | 47        | 6    | 114  | 2     | 1   | 122       | 8    | 33   | 10    | 0   | 51        | 6    | 106  | 1     | 1   | 113       | 333       |

|          |      |      |      |   |      |      |      |      |   |      |      |      |      |   |      |      |   |
|----------|------|------|------|---|------|------|------|------|---|------|------|------|------|---|------|------|---|
| 11:15 AM | 3    | 33   | 10   | 0 | 46   | 4    | 126  | 2    | 0 | 132  | 12   | 41   | 5    | 2 | 163  | 399  |   |
| 11:30 AM | 5    | 40   | 3    | 0 | 48   | 8    | 130  | 4    | 3 | 142  | 12   | 38   | 8    | 0 | 131  | 379  |   |
| 11:45 AM | 4    | 50   | 8    | 1 | 62   | 3    | 117  | 5    | 2 | 125  | 10   | 55   | 6    | 1 | 139  | 397  |   |
| Total    | 16   | 162  | 25   | 1 | 203  | 21   | 487  | 13   | 6 | 521  | 42   | 167  | 29   | 1 | 546  | 1508 |   |
| PHF      | 0.80 | 0.81 | 0.63 |   | 0.82 | 0.66 | 0.94 | 0.65 |   | 0.92 | 0.88 | 0.76 | 0.73 |   | 0.84 | 0.84 |   |
| HV %     | 0    | 2    | 0    |   | 5    | 4    | 8    |      |   | 5    | 2    | 3    |      |   | 0    | 4    | 5 |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



**PM Peak Hour**  
**06/22/2015**

| NB         |      |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:30 PM    | 2    | 40   | 7     | 3   | 49        | 9    | 155  | 7     | 2   | 171       | 12   | 40   | 7     | 3   | 59        | 18   | 128  | 7     | 0   | 153       | 432       |
| 4:45 PM    | 2    | 58   | 7     | 1   | 67        | 5    | 158  | 8     | 0   | 171       | 13   | 57   | 6     | 1   | 76        | 10   | 150  | 14    | 2   | 174       | 488       |
| 5:00 PM    | 8    | 72   | 12    | 1   | 92        | 7    | 149  | 2     | 0   | 158       | 8    | 37   | 3     | 0   | 48        | 13   | 142  | 16    | 0   | 171       | 469       |
| 5:15 PM    | 9    | 56   | 9     | 0   | 74        | 4    | 143  | 12    | 8   | 159       | 22   | 41   | 3     | 3   | 66        | 13   | 113  | 11    | 0   | 137       | 436       |
| Total      | 21   | 226  | 35    | 5   | 282       | 25   | 605  | 29    | 10  | 659       | 55   | 175  | 19    | 7   | 249       | 54   | 533  | 48    | 2   | 635       | 1825      |
| PHF        | 0.58 | 0.78 | 0.73  |     | 0.77      | 0.69 | 0.96 | 0.60  |     | 0.96      | 0.63 | 0.77 | 0.68  |     | 0.82      | 0.75 | 0.89 | 0.75  |     | 0.91      |           |
| HV %       | 5    | 1    | 6     |     |           | 0    | 2    | 3     |     |           | 0    | 1    | 0     |     |           | 0    | 2    | 0     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes



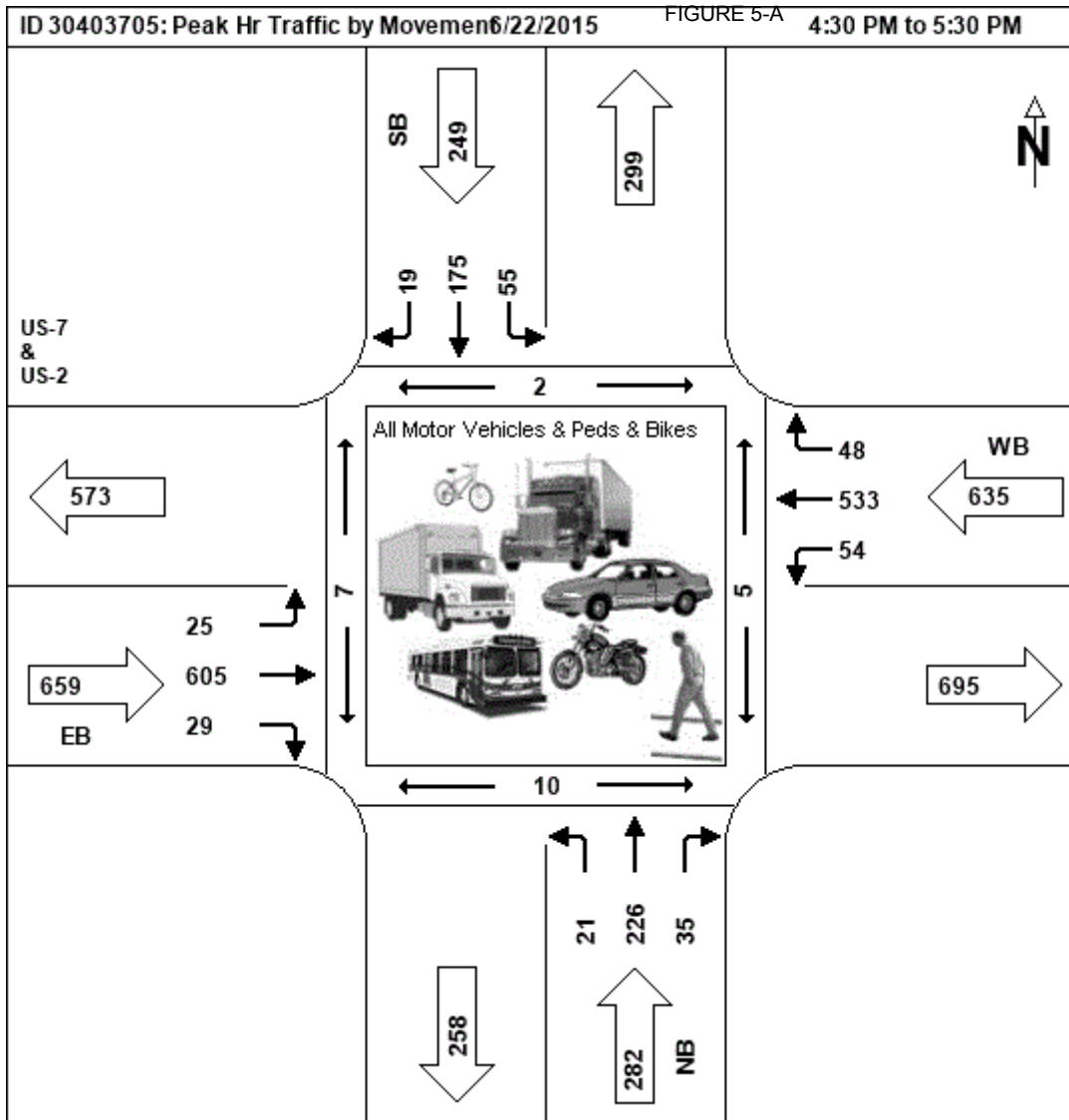


FIGURE 5-A

## Peak Hour Data for Intersection

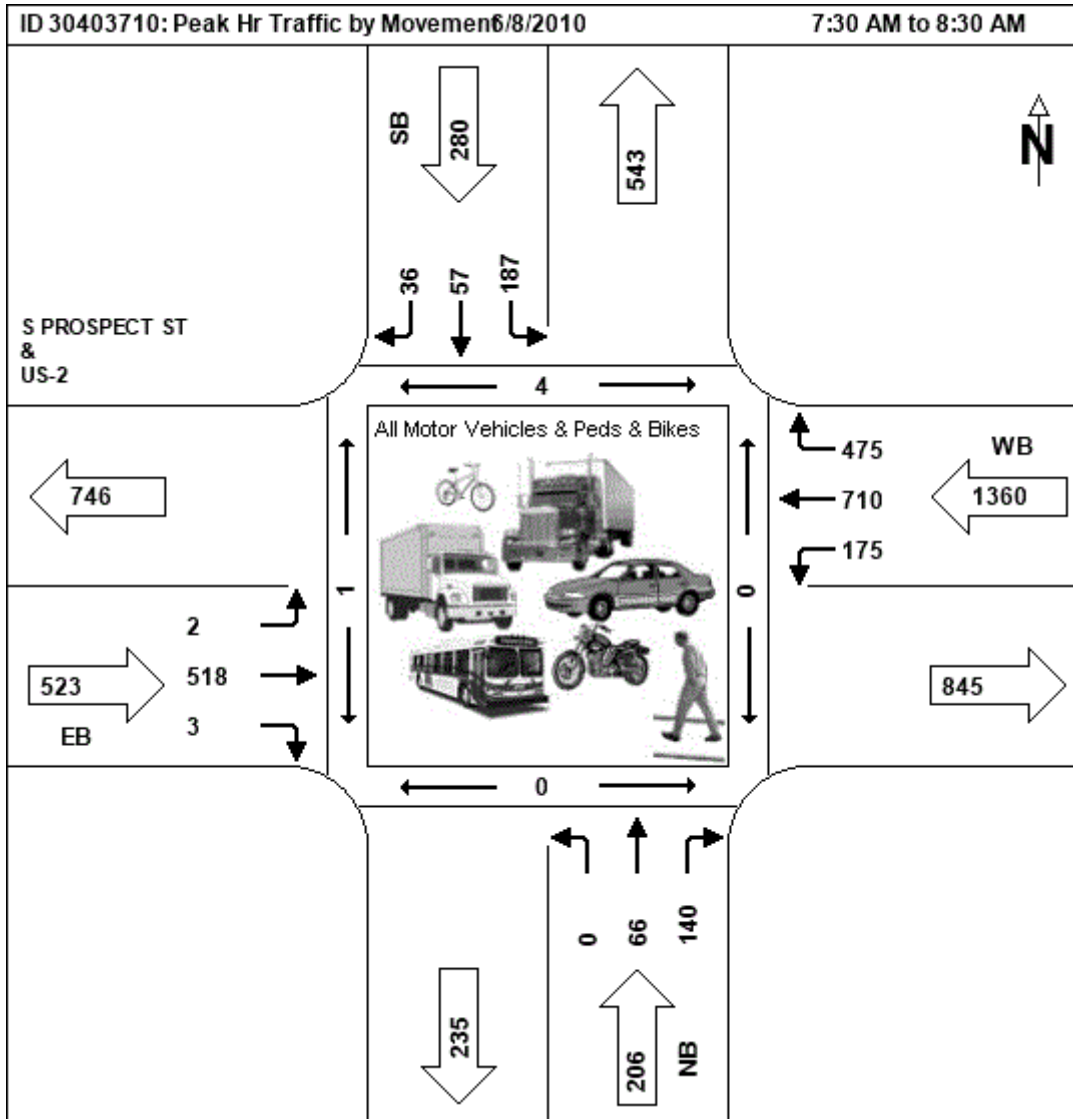
Int ID: 30403710  
 Community: BURLINGTON  
 Road 1: S PROSPECT ST  
 Road 2: US-2

Corridor: NA  
 Road 3: S PROSPECT ST  
 Road 4: US-2

|<<|<|>|>>| 1-3 of 3

**AM Peak Hour**  
**06/08/2010**

| NB                                                                                                                                                                                                                                |      |      |       |     | EB        |      |      |       |      | SB        |      |      |       |     | WB        |      |      |       |     |           |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-----|-----------|------|------|-------|------|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------------|
| Start Time                                                                                                                                                                                                                        | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped  | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int. Total |
| 7:30 AM                                                                                                                                                                                                                           | 0    | 13   | 23    | 0   | 36        | 2    | 148  | 1     | 0    | 151       | 55   | 14   | 2     | 0   | 71        | 40   | 166  | 104   | 1   | 310       | 568        |
| 7:45 AM                                                                                                                                                                                                                           | 0    | 27   | 42    | 0   | 69        | 0    | 124  | 0     | 0    | 124       | 57   | 24   | 9     | 0   | 90        | 54   | 205  | 130   | 2   | 389       | 672        |
| 8:00 AM                                                                                                                                                                                                                           | 0    | 14   | 32    | 0   | 46        | 0    | 111  | 1     | 0    | 112       | 31   | 8    | 16    | 0   | 55        | 34   | 158  | 114   | 0   | 306       | 519        |
| 8:15 AM                                                                                                                                                                                                                           | 0    | 12   | 43    | 0   | 55        | 0    | 135  | 1     | 0    | 136       | 44   | 11   | 9     | 1   | 64        | 47   | 181  | 127   | 1   | 355       | 610        |
| Total                                                                                                                                                                                                                             | 0    | 66   | 140   | 0   | 206       | 2    | 518  | 3     | 0    | 523       | 187  | 57   | 36    | 1   | 280       | 175  | 710  | 475   | 4   | 1360      | 2369       |
| PHF                                                                                                                                                                                                                               |      | 0.61 | 0.81  |     | 0.75      |      | 0.25 | 0.88  | 0.75 | 0.87      | 0.82 | 0.59 | 0.56  |     | 0.78      | 0.81 | 0.87 | 0.91  |     | 0.87      |            |
| HV %                                                                                                                                                                                                                              |      | 2    | 1     |     |           |      | 0    | 4     | 0    |           | 2    | 9    | 3     |     |           | 3    | 4    | 2     |     |           |            |
| <div><div><input checked="" type="checkbox"/> Cars</div><div><input checked="" type="checkbox"/> Trucks</div><div><input checked="" type="checkbox"/> Pedestrians</div><div><input checked="" type="checkbox"/> Bikes</div></div> |      |      |       |     |           |      |      |       |      |           |      |      |       |     |           |      |      |       |     |           |            |

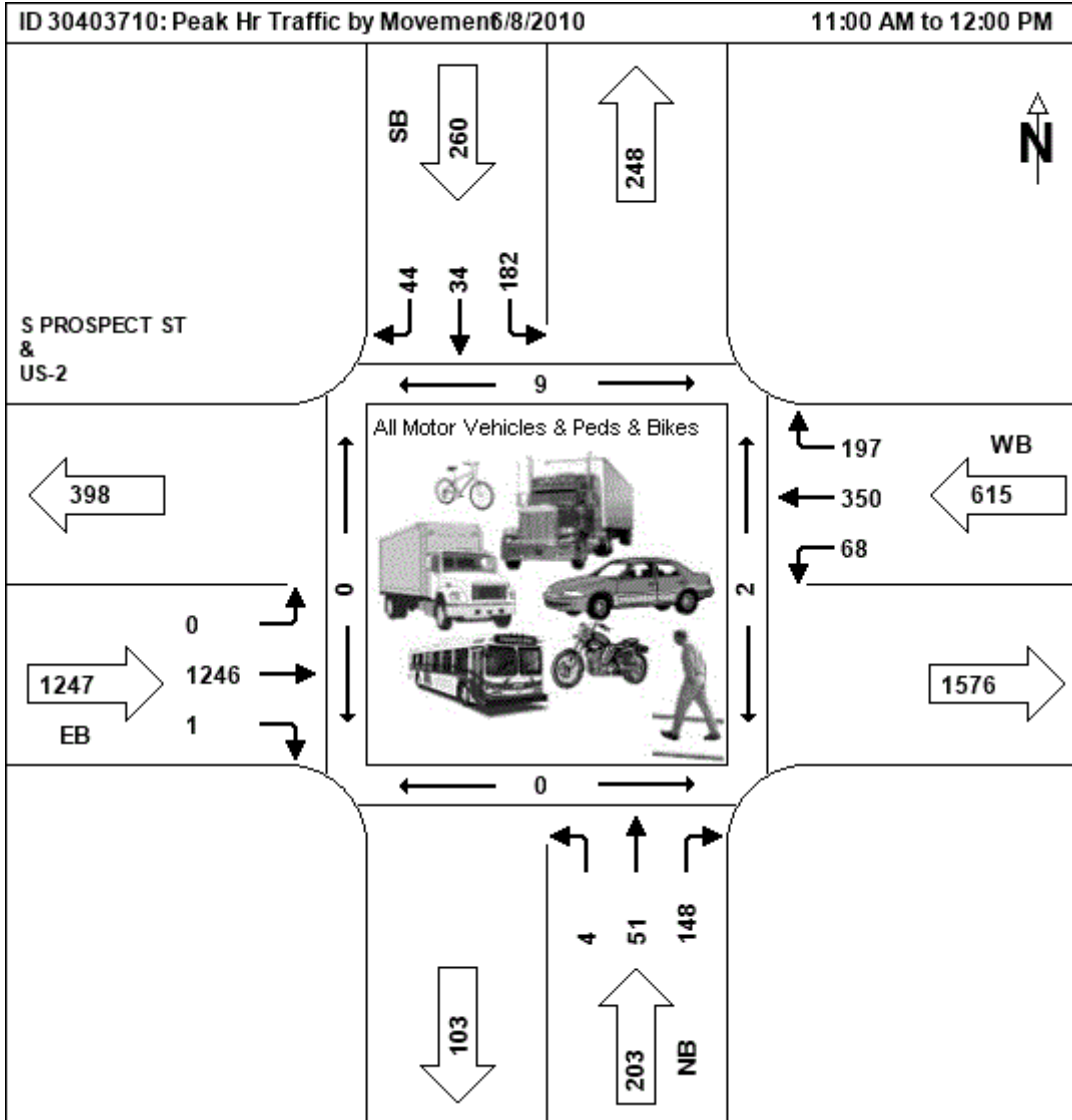


**Midday Peak Hour**  
**06/08/2010**

| NB         |      |      |       |     |           | EB   |      |       |     |           |      | SB   |       |     |           |      |      | WB    |     |           |           |  |  |
|------------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|--|--|
| Start Time | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |  |  |
| 11:00 AM   | 0    | 7    | 27    | 0   | 34        | 0    | 178  | 0     | 0   | 178       | 40   | 6    | 8     | 0   | 54        | 13   | 77   | 38    | 0   | 128       | 394       |  |  |

|          |      |      |      |   |      |   |      |      |   |      |      |      |           |    |      |      |      |      |     |      |      |
|----------|------|------|------|---|------|---|------|------|---|------|------|------|-----------|----|------|------|------|------|-----|------|------|
| 11:15 AM | 1    | 10   | 47   | 2 | 58   | 0 | 304  | 1    | 0 | 305  | 47   | 9    | FIGURE 5A | 12 | 87   | 55   | 0    | 154  | 583 |      |      |
| 11:30 AM | 3    | 15   | 46   | 0 | 64   | 0 | 426  | 0    | 0 | 426  | 50   | 4    | 15        | 0  | 69   | 23   | 97   | 61   | 7   | 181  | 740  |
| 11:45 AM | 0    | 19   | 28   | 0 | 47   | 0 | 338  | 0    | 0 | 338  | 45   | 15   | 11        | 0  | 71   | 20   | 89   | 43   | 2   | 152  | 608  |
| Total    | 4    | 51   | 148  | 2 | 203  | 0 | 1246 | 1    | 0 | 1247 | 182  | 34   | 44        | 0  | 260  | 68   | 350  | 197  | 9   | 615  | 2325 |
| PHF      | 0.33 | 0.67 | 0.79 |   | 0.79 |   | 0.73 | 0.25 |   | 0.73 | 0.91 | 0.57 | 0.73      |    | 0.92 | 0.74 | 0.90 | 0.81 |     | 0.85 |      |
| HV %     | 0    | 2    | 3    |   |      |   | 2    | 0    |   |      | 5    | 15   | 0         |    |      | 0    | 5    | 3    |     |      |      |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes

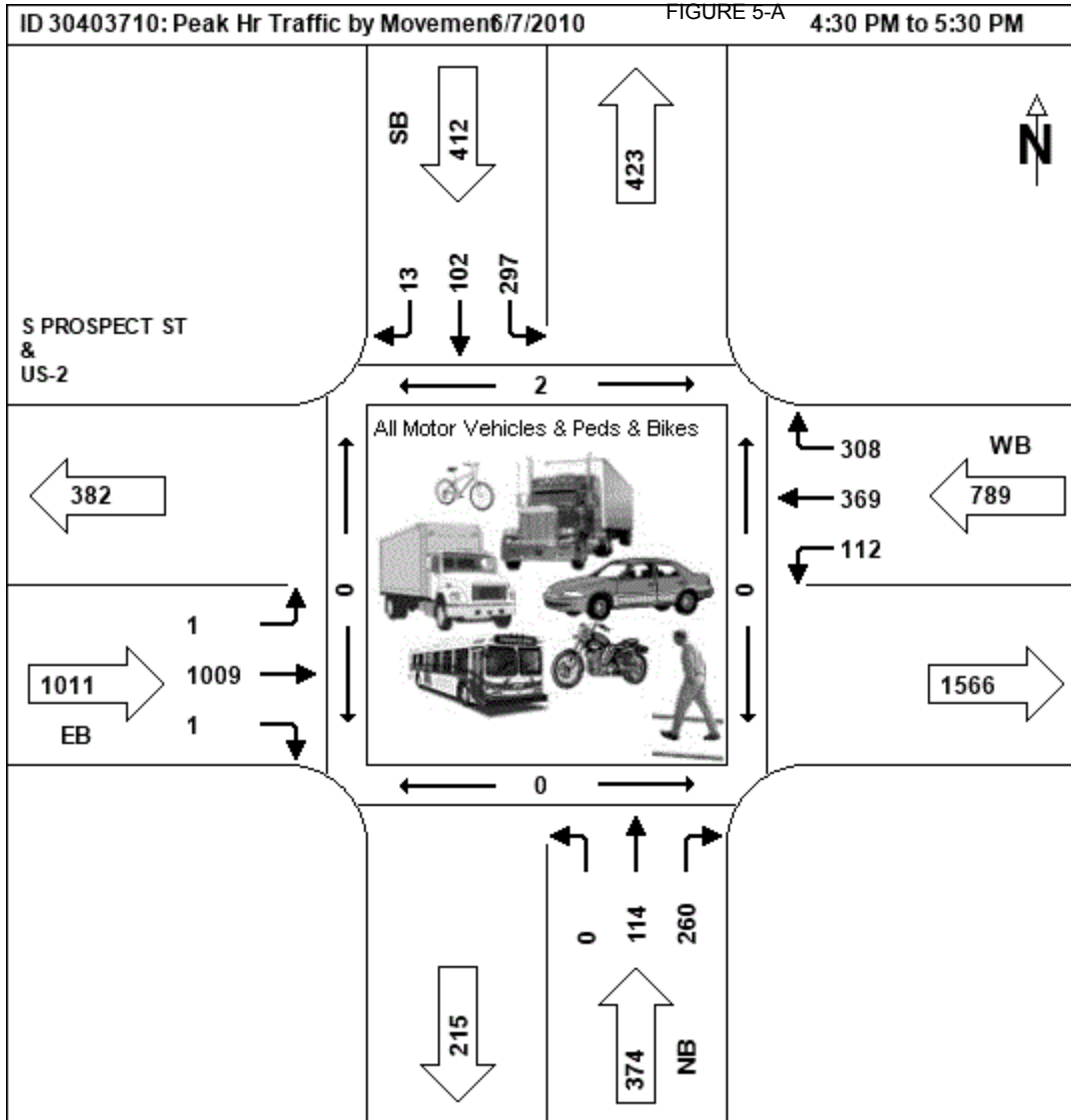


**PM Peak Hour**  
**06/07/2010**

| NB         |           |      |       |     | EB        |      |      |       |     | SB        |      |      |       |     | WB        |      |      |       |     |           |           |
|------------|-----------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|------|------|-------|-----|-----------|-----------|
| Start Time | Left      | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Left | Thru | Right | Ped | App Total | Int Total |
| 4:30 PM    | 0         | 27   | 67    | 0   | 94        | 1    | 265  | 0     | 0   | 266       | 78   | 19   | 3     | 0   | 100       | 31   | 75   | 67    | 0   | 173       | 633       |
| 4:45 PM    | 0         | 22   | 52    | 0   | 74        | 0    | 252  | 0     | 0   | 252       | 63   | 25   | 6     | 0   | 94        | 24   | 88   | 75    | 1   | 187       | 607       |
| 5:00 PM    | 0         | 36   | 71    | 0   | 107       | 0    | 262  | 1     | 0   | 263       | 71   | 29   | 3     | 0   | 103       | 26   | 101  | 77    | 0   | 204       | 677       |
| 5:15 PM    | 0         | 29   | 70    | 0   | 99        | 0    | 230  | 0     | 0   | 230       | 85   | 29   | 1     | 0   | 115       | 31   | 105  | 89    | 1   | 225       | 669       |
| Total      | 0         | 114  | 260   | 0   | 374       | 1    | 1009 | 1     | 0   | 1011      | 297  | 102  | 13    | 0   | 412       | 112  | 369  | 308   | 2   | 789       | 2586      |
| PHF        | 0.79 0.92 |      |       |     | 0.87      | 0.25 | 0.95 | 0.25  |     | 0.95      | 0.87 | 0.88 | 0.54  |     | 0.90      | 0.90 | 0.88 | 0.87  |     | 0.88      |           |
| HV %       | 1 1       |      |       |     |           | 0    | 1    | 0     |     |           | 1    | 2    | 0     |     |           | 4    | 2    | 1     |     |           |           |

☒ Cars ☒ Trucks ☒ Pedestrians ☒ Bikes







## Crash Data

FIGURE 5-A

## Vermont Agency of Transportation

## Statewide Intersections - Route Log Order /2 - Statewide

Years: 2010 - 2014

| H.C.L<br>No. | /3. Route                                                                             | System                                     | Town             | Mileage       | ADT   | Years | Crashes | Fatalities | Injuries | PDO<br>Crashes | Critical<br>Rate | Actual<br>Rate | Ratio<br>Actual/Critical | Severity Index<br>(\$/Accident/1) |
|--------------|---------------------------------------------------------------------------------------|--------------------------------------------|------------------|---------------|-------|-------|---------|------------|----------|----------------|------------------|----------------|--------------------------|-----------------------------------|
| #            | 35 US-2, VT-78, TOWN ROAD 0004                                                        | Principal Arterial (r)                     | Alburgh          | 6.180 - 6.280 | 6205  | 5     | 12      | 0          | 5        | 8              | 0.718            | 1.059          | 1.475                    | \$38,808                          |
|              | 8 US-2, I-89                                                                          | Minor Arterial (u)                         | Colchester       | 1.830 - 2.030 | 11805 | 5     | 38      | 0          | 21       | 26             | 0.867            | 1.763          | 2.033                    | \$49,692                          |
|              | 65 US-2, I-89                                                                         | Principal Arterial (u)                     | Colchester       | 2.040 - 2.150 | 5360  | 5     | 16      | 0          | 6        | 11             | 1.282            | 1.635          | 1.276                    | \$35,706                          |
| #            | 17 US-2, S PROSPECT ST., BURLINGTON, <T0000>                                          | Principal Arterial (u)/Urban Collector (u) | Burlington       | 0.220 - 0.240 | 27040 | 5     | 73      | 0          | 18       | 62             | 0.83             | 1.479          | 1.781                    | \$27,014                          |
| #            | 14 US-2, DORSET ST., SOUTH BURLINGTON                                                 | Principal Arterial (u)/Urban Collector (u) | South Burlington | 0.490 - 0.500 | 40960 | 5     | 106     | 0          | 10       | 99             | 0.782            | 1.418          | 1.813                    | \$15,756                          |
| #            | 56 US-2, WHITE ST., SOUTH BURLINGTON                                                  | Principal Arterial (u)/Urban Collector (u) | South Burlington | 0.860 - 0.880 | 28990 | 5     | 57      | 0          | 9        | 49             | 0.821            | 1.077          | 1.311                    | \$20,109                          |
| #            | 43 US-2, PATCHEN ROAD, SOUTH BURLINGTON, VT-116                                       | Principal Arterial (u)/Urban Collector (u) | South Burlington | 0.990 - 1.010 | 29890 | 5     | 61      | 0          | 5        | 58             | 0.817            | 1.118          | 1.367                    | \$14,930                          |
| #            | 97 US-2, AIRPORT DRIVE, SOUTH BURLINGTON, SO.<br>BURLINGTON (FAP 121-1 KENNEDY DRIVE) | Principal Arterial (u)/Minor Arterial (u)  | South Burlington | 1.880 - 1.910 | 27435 | 5     | 74      | 0          | 12       | 64             | 1.354            | 1.477          | 1.091                    | \$20,492                          |
| *            | 78 US-2, INDUSTRIAL AVE., WILLISTON                                                   | Principal Arterial (u)/Urban Collector (u) | Williston        | 0.250 - 0.270 | 14910 | 5     | 29      | 0          | 3        | 27             | 0.917            | 1.065          | 1.161                    | \$16,448                          |
|              | 72 US-2, VT-2A                                                                        | Principal Arterial (u)/Minor Arterial (u)  | Williston        | 1.420 - 1.440 | 26890 | 5     | 79      | 0          | 11       | 72             | 1.357            | 1.609          | 1.186                    | \$19,097                          |
|              | 10 US-2, FAS 0209                                                                     | Major Collector (r)                        | Richmond         | 2.690 - 2.770 | 9389  | 5     | 26      | 0          | 1        | 25             | 0.758            | 1.517          | 2                        | \$11,592                          |
|              | 48 VT-2A, MARSHALL AVE., WILLISTON                                                    | Principal Arterial (u)/Urban Collector (u) | Williston        | 3.320 - 3.340 | 30820 | 5     | 61      | 0          | 6        | 56             | 0.814            | 1.084          | 1.332                    | \$15,931                          |
|              | 42 VT-2A, INDUSTRIAL AVE., WILLISTON, MT. VIEW<br>ROAD, WILLISTON                     | Minor Arterial (u)/Urban Collector (u)     | Williston        | 4.780 - 4.800 | 21270 | 5     | 46      | 0          | 8        | 40             | 0.857            | 1.185          | 1.381                    | \$21,461                          |
|              | 89 VT-2A, EAST ROAD, COLCHESTER, MILL POND<br>ROAD, COLCHESTER                        | Minor Arterial (u)/Urban Collector (u)     | Colchester       | 1.430 - 1.510 | 14475 | 5     | 27      | 0          | 7        | 20             | 0.917            | 1.022          | 1.114                    | \$27,048                          |
|              | 102 US-4, FAS 0168                                                                    | Principal Arterial (r)/Major Collector (r) | Hartford         | 3.310 - 3.390 | 10609 | 5     | 15      | 0          | 3        | 12             | 0.716            | 0.774          | 1.081                    | \$22,900                          |
|              | 114 US-4, QUEECHE STATE HIGHWAY                                                       | Principal Arterial (r)                     | Hartford         | 5.780 - 5.940 | 12000 | 5     | 14      | 0          | 6        | 10             | 0.617            | 0.639          | 1.036                    | \$40,171                          |
|              | 40 US-4, I-89                                                                         | Principal Arterial (r)/Minor Arterial (r)  | Hartford         | 6.430 - 6.590 | 6280  | 5     | 15      | 0          | 8        | 9              | 0.943            | 1.308          | 1.387                    | \$47,420                          |
|              | 75 VT-4A, VT-30                                                                       | Minor Arterial (r)/Major Collector (r)     | Castleton        | 1.760 - 1.860 | 9970  | 5     | 21      | 0          | 6        | 15             | 0.983            | 1.154          | 1.173                    | \$28,900                          |
| #            | 36 US-5, FAIRGROUND ROAD, BRATTLEBORO                                                 | Minor Arterial (u)/Urban Collector (u)     | Brattleboro      | 1.130 - 1.150 | 10925 | 5     | 28      | 0          | 2        | 26             | 0.968            | 1.404          | 1.45                     | \$13,900                          |
| #            | 106 US-5, FAIRVIEW AVE., BRATTLEBORO                                                  | Minor Arterial (u)/Urban Collector (u)     | Brattleboro      | 1.210 - 1.230 | 10465 | 5     | 20      | 0          | 6        | 14             | 0.976            | 1.047          | 1.072                    | \$29,900                          |
| #            | 80 US-5, BIRGE ST., BRATTLEBORO, <T0000>                                              | Minor Arterial (u)/Urban Collector (u)     | Brattleboro      | 1.650 - 1.680 | 11950 | 5     | 24      | 0          | 7        | 19             | 0.951            | 1.1            | 1.157                    | \$30,058                          |



FIGURE 5-A

## Vermont Agency of Transportation

## Statewide Intersections - Route Log Order /2 - Statewide

Years: 2010 - 2014

| H.C.L No. | /3. Route                                                                                       | System                                     | Town                        | Mileage       | ADT   | Years | Crashes | Fatalities | Injuries | PDO Crashes | Critical Rate | Actual Rate | Ratio Actual/Critical | Severity Index (\$/Accident/1) |
|-----------|-------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------|---------------|-------|-------|---------|------------|----------|-------------|---------------|-------------|-----------------------|--------------------------------|
| #         | 71 US-7, <0189>, SWIFT ST., SOUTH BURLINGTON                                                    | Principal Arterial (u)/Urban Collector (u) | South Burlington/Burlington | 1.720 - 0.010 | 39650 | 5     | 66      | 0          | 4        | 62          | 0.788         | 0.935       | 1.187                 | \$13,142                       |
| #         | 11 US-7, MAIN ST., BURLINGTON, US-2                                                             | Principal Arterial (u)                     | Burlington                  | 2.110 - 2.130 | 21900 | 5     | 74      | 0          | 13       | 64          | 0.981         | 1.851       | 1.886                 | \$21,558                       |
| #         | 67 US-7, PEARL ST., BURLINGTON                                                                  | Principal Arterial (u)/Minor Arterial (u)  | Burlington                  | 2.420 - 2.440 | 17520 | 5     | 58      | 0          | 15       | 47          | 1.44          | 1.813       | 1.259                 | \$27,617                       |
| #         | 49 US-7, BURLINGTON (ALTERNATE US-7)                                                            | Principal Arterial (u)                     | Burlington                  | 3.050 - 3.070 | 12135 | 5     | 32      | 0          | 6        | 27          | 1.085         | 1.444       | 1.331                 | \$22,303                       |
| #         | 6 US-7, W. ALLEN ST., WINOOSKI CITY, VT-15, E. CANAL ST., WINOOS, W. CENTER ST., WINOO, <T0000> | Principal Arterial (u)/Minor Arterial (u)  | Winooski City               | 0.040 - 0.230 | 28231 | 5     | 152     | 0          | 22       | 134         | 1.349         | 2.95        | 2.186                 | \$19,266                       |
| #         | 46 US-7, E SPRING ST., WINOOSKI CITY, W SPRING ST., WINOOSKI CITY                               | Principal Arterial (u)/Urban Collector (u) | Winooski City               | 0.430 - 0.450 | 17340 | 5     | 38      | 0          | 14       | 30          | 0.893         | 1.2         | 1.344                 | \$36,095                       |
| *         | 129 US-7, I-89                                                                                  | Principal Arterial (u)                     | Colchester                  | 0.170 - 0.230 | 19612 | 5     | 36      | 0          | 6        | 31          | 0.999         | 1.005       | 1.007                 | \$20,814                       |
|           | 127 US-7, VT. 127 TH, COLCHESTER, SEVERANCE ROAD, COLCHESTER                                    | Principal Arterial (u)/Minor Arterial (u)  | Colchester                  | 1.940 - 2.040 | 19140 | 5     | 50      | 0          | 16       | 39          | 1.421         | 1.431       | 1.007                 | \$32,190                       |
|           | 26 US-7, VT-2A                                                                                  | Principal Arterial (u)/Minor Arterial (u)  | Colchester                  | 3.580 - 3.650 | 11830 | 5     | 54      | 0          | 11       | 47          | 1.531         | 2.501       | 1.633                 | \$23,819                       |
|           | 63 US-7, VT-207                                                                                 | Major Collector (r)                        | St. Albans Town             | 2.290 - 2.310 | 8950  | 5     | 16      | 0          | 11       | 8           | 0.766         | 0.979       | 1.277                 | \$58,694                       |
|           | 66 VT-7A                                                                                        | Minor Arterial (u)                         | Bennington                  | 0.100 - 0.120 | 13327 | 5     | 26      | 0          | 5        | 23          | 0.846         | 1.069       | 1.262                 | \$23,046                       |
|           | 45 VT-7A, RICE LN., BENNINGTON, <T0000>                                                         | Minor Arterial (u)/Urban Collector (u)     | Bennington                  | 1.700 - 1.720 | 5900  | 5     | 16      | 0          | 18       | 5           | 1.102         | 1.485       | 1.347                 | \$91,544                       |
| #         | 124 VT-9, DEPOT ST., BENNINGTON, WASHINGTON ST., BENNINGTON                                     | Principal Arterial (u)/Urban Collector (u) | Bennington                  | 4.260 - 4.280 | 10500 | 5     | 19      | 0          | 2        | 17          | 0.981         | 0.991       | 1.01                  | \$16,268                       |
| #         | 120 VT-9, UNION ST., BENNINGTON, PLEASANT ST., BENNINGTON                                       | Principal Arterial (u)/Urban Collector (u) | Bennington                  | 4.810 - 4.830 | 10300 | 5     | 19      | 0          | 6        | 14          | 0.985         | 1.01        | 1.026                 | \$31,474                       |
|           | 51 VT-9, VT-100, TOWN ROAD 0033                                                                 | Principal Arterial (r)/Minor Arterial (r)  | Wilmington                  | 2.990 - 3.050 | 9027  | 5     | 19      | 0          | 0        | 19          | 0.87          | 1.153       | 1.324                 | \$8,900                        |
|           | 58 VT-11, VT-30                                                                                 | Minor Arterial (r)                         | Winhall                     | 3.030 - 3.230 | 7037  | 5     | 11      | 0          | 2        | 9           | 0.656         | 0.856       | 1.306                 | \$21,627                       |
|           | 24 VT-11, VT-100, TOWN ROAD 0059                                                                | Minor Arterial (r)                         | Londonderry                 | 1.880 - 1.960 | 5810  | 5     | 12      | 0          | 3        | 9           | 0.687         | 1.131       | 1.646                 | \$26,400                       |
| #         | 37 VT-11, VT-106                                                                                | Minor Arterial (r)/Major Collector (r)     | Springfield                 | 3.950 - 4.030 | 14600 | 5     | 35      | 0          | 2        | 33          | 0.913         | 1.313       | 1.438                 | \$12,900                       |
| #         | 62 VT-11, FAS 0136 (VT-143 TH)                                                                  | Minor Arterial (r)/Major Collector (r)     | Springfield                 | 4.590 - 4.660 | 12227 | 5     | 27      | 0          | 1        | 26          | 0.944         | 1.209       | 1.281                 | \$11,493                       |
|           | 125 VT-12, VT-64                                                                                | Major Collector (r)                        | Northfield                  | 1.980 - 2.080 | 4934  | 5     | 8       | 0          | 7        | 3           | 0.881         | 0.888       | 1.008                 | \$72,375                       |
|           | 101 VT-14, VT-63, TOWN ROAD 0004                                                                | Minor Arterial (r)/Major Collector (r)     | Barre Town                  | 1.650 - 1.730 | 11025 | 5     | 21      | 0          | 5        | 17          | 0.964         | 1.043       | 1.083                 | \$25,990                       |

FIGURE 5-A

## Vermont Agency of Transportation

## Statewide Intersections - Route Log Order /2 - Statewide

Years: 2010 - 2014

| H.C.L<br>No. | /3. Route                                                                       | System                                     | Town               | Mileage       | ADT   | Years | Crashes | Fatalities | Injuries | PDO<br>Crashes | Critical<br>Rate | Actual<br>Rate | Ratio<br>Actual/Critical | Severity Index<br>(\$/Accident/1.) |
|--------------|---------------------------------------------------------------------------------|--------------------------------------------|--------------------|---------------|-------|-------|---------|------------|----------|----------------|------------------|----------------|--------------------------|------------------------------------|
|              | 103 VT-105, VT-100                                                              | Minor Arterial (r)                         | Newport Town       | 4.190 - 4.350 | 4041  | 5     | 6       | 0          | 1        | 5              | 0.753            | 0.813          | 1.08                     | \$20,567                           |
|              | 76 VT-112, FAS 0111 (VT 8A TH)                                                  | Minor Arterial (r)/Major Collector (r)     | Halifax/Whitingham | 5.810 - 0.140 | 1523  | 5     | 5       | 0          | 3        | 3              | 1.535            | 1.798          | 1.171                    | \$52,680                           |
| *            | 29 VT-116, FAS 0210                                                             | Minor Arterial (r)/Major Collector (r)     | Hinesburg          | 5.410 - 5.510 | 10951 | 5     | 31      | 0          | 5        | 26             | 0.965            | 1.551          | 1.607                    | \$20,190                           |
|              | 131 VT-116, VT-2A                                                               | Minor Arterial (r)/Major Collector (r)     | St. George         | 0.270 - 0.370 | 10042 | 5     | 18      | 0          | 6        | 13             | 0.982            | 0.982          | 1                        | \$32,728                           |
|              | 118 VT-116, CHEESEFACTORY RD., SOUTH BURLINGTON                                 | Principal Arterial (u)/Urban Collector (u) | South Burlington   | 0.160 - 0.320 | 6975  | 5     | 14      | 0          | 6        | 11             | 1.068            | 1.099          | 1.029                    | \$40,807                           |
|              | 115 VT-117, FAS 0213                                                            | Minor Arterial (r)/Major Collector (r)     | Richmond           | 0.650 - 0.750 | 6350  | 5     | 13      | 0          | 1        | 12             | 1.082            | 1.121          | 1.036                    | \$14,285                           |
| #            | 83 VT-125, WEYBRIDGE ST., MIDDLEBURY                                            | Minor Arterial (u)                         | Middlebury         | 0.890 - 1.030 | 6937  | 5     | 14      | 0          | 1        | 13             | 0.97             | 1.105          | 1.139                    | \$13,900                           |
| #            | 110 VT-142, BRIDGE ST., VT 119, BRATTLEBORO                                     | Minor Arterial (u)                         | Brattleboro        | 2.150 - 2.170 | 10470 | 5     | 18      | 0          | 1        | 17             | 0.888            | 0.942          | 1.06                     | \$12,789                           |
| *            | 93 US-302, VT-110, TOWN ROAD 0030                                               | Minor Arterial (r)/Major Collector (r)     | Barre Town         | 2.470 - 2.630 | 7090  | 5     | 15      | 0          | 2        | 13             | 1.056            | 1.159          | 1.097                    | \$18,233                           |
|              | 99 US-302, VT-25                                                                | Minor Arterial (r)                         | Orange             | 6.010 - 6.110 | 3130  | 5     | 5       | 0          | 3        | 3              | 0.804            | 0.875          | 1.088                    | \$52,680                           |
|              | 73 VT-313, FAS 0171, TOWN ROAD 0004                                             | Minor Arterial (r)/Major Collector (r)     | Arlington          | 7.110 - 7.240 | 2845  | 5     | 8       | 0          | 7        | 1              | 1.309            | 1.54           | 1.177                    | \$70,150                           |
| #            | 77 WEST RUTLAND-RUTLAND (BR US-4), GROVE ST., RUTLAND CITY                      | Minor Arterial (u)                         | Rutland City       | 1.400 - 1.420 | 8650  | 5     | 17      | 0          | 3        | 14             | 0.924            | 1.076          | 1.164                    | \$21,253                           |
| #            | 2 BURLINGTON (ALTERNATE US-7), MAIN ST., BURLINGTON                             | Principal Arterial (u)                     | Burlington         | 0.990 - 1.010 | 20430 | 5     | 101     | 0          | 11       | 93             | 0.992            | 2.708          | 2.729                    | \$16,788                           |
| #            | 59 BURLINGTON (ALTERNATE US-7), PEARL ST., BURLINGTON                           | Principal Arterial (u)/Minor Arterial (u)  | Burlington         | 1.310 - 1.330 | 17040 | 5     | 58      | 0          | 15       | 46             | 1.446            | 1.865          | 1.29                     | \$27,464                           |
| #            | 31 BURLINGTON (ALTERNATE US-7), NORTH ST., BURLINGTON                           | Principal Arterial (u)/Urban Collector (u) | Burlington         | 1.620 - 1.640 | 7380  | 5     | 22      | 0          | 5        | 17             | 1.055            | 1.633          | 1.547                    | \$24,809                           |
|              | 54 SO. BURLINGTON (FAP 121-1 KENNEDY DRIVE), DORSET ST., SOUTH BURLINGTON. I-89 | Minor Arterial (u)/Urban Collector (u)     | South Burlington   | 0.000 - 0.010 | 19000 | 5     | 40      | 0          | 2        | 38             | 0.874            | 1.153          | 1.319                    | \$12,400                           |
|              | 104 COUNTY RD., BENNINGTON, PARK ST., BENNINGTON, <T0000>                       | Minor Arterial (u)/Urban Collector (u)     | Bennington         | 0.460 - 0.480 | 7250  | 5     | 15      | 0          | 1        | 14             | 1.053            | 1.133          | 1.076                    | \$13,567                           |
|              | 52 DEPOT ST., BENNINGTON, COUNTY RD., BENNINGTON                                | Urban Collector (u)                        | Bennington         | 0.350 - 0.370 | 6600  | 5     | 15      | 0          | 6        | 10             | 0.942            | 1.245          | 1.321                    | \$37,493                           |
|              | 91 ELM ST., BENNINGTON, DEWEY ST., BENNINGTON                                   | Urban Collector (u)                        | Bennington         | 0.360 - 0.380 | 7640  | 5     | 14      | 0          | 5        | 11             | 0.912            | 1.004          | 1.101                    | \$35,171                           |
|              | 53 PLEASANT ST., BENNINGTON, SCHOOL ST., BENNINGTON                             | Urban Collector (u)                        | Bennington         | 0.100 - 0.120 | 3380  | 5     | 9       | 0          | 5        | 6              | 1.106            | 1.459          | 1.319                    | \$49,767                           |
|              | 94 UNION ST., BENNINGTON, SILVER ST., BENNINGTON                                | Urban Collector (u)                        | Bennington         | 0.160 - 0.180 | 3095  | 5     | 7       | 0          | 0        | 7              | 1.13             | 1.239          | 1.096                    | \$8,900                            |

FIGURE 5-A

## Vermont Agency of Transportation

## Statewide Intersections - Route Log Order /2 - Statewide

Years: 2010 - 2014

| H.C.L<br>No. | /3. Route                                                                                                 | System                                        | Town             | Mileage       | ADT   | Years | Crashes | Fatalities | Injuries | PDO<br>Crashes | Critical<br>Rate | Actual<br>Rate | Ratio<br>Actual/Critical | Severity Index<br>(\$/Accident/1.) |
|--------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------|---------------|-------|-------|---------|------------|----------|----------------|------------------|----------------|--------------------------|------------------------------------|
|              | 22 COLCHESTER AVE., BURLINGTON, BARRETT ST., BURLINGTON                                                   | Minor Arterial (u)/Urban Collector (u)        | Burlington       | 0.990 - 1.010 | 7595  | 5     | 24      | 1          | 5        | 19             | 1.043            | 1.731          | 1.659                    | \$82,233                           |
|              | 55 STRONGS AVE., RUTLAND CITY, WASHINGTON ST., RUTLAND CITY                                               | Principal Arterial (u)/Urban Collector (u)    | Rutland City     | 0.600 - 0.620 | 10610 | 5     | 25      | 0          | 11       | 17             | 0.979            | 1.291          | 1.318                    | \$40,768                           |
|              | 16 BATTERY ST., BURLINGTON, MAIN ST., BURLINGTON                                                          | Principal Arterial (u)                        | Burlington       | 0.220 - 0.240 | 15300 | 5     | 52      | 0          | 11       | 42             | 1.041            | 1.862          | 1.788                    | \$23,879                           |
|              | 4 VT. 127 BELTLINE, BURLINGTON, <5009>                                                                    | Freeway/Expressway (u)                        | Burlington       | 1.340 - 1.500 | 5205  | 5     | 7       | 0          | 6        | 4              | 0.316            | 0.736          | 2.328                    | \$72,714                           |
|              | 1 VT. 127 BELTLINE, BURLINGTON, <5042>                                                                    | Freeway/Expressway (u)                        | Burlington       | 3.360 - 3.470 | 6573  | 5     | 10      | 0          | 11       | 5              | 0.298            | 0.833          | 2.797                    | \$91,240                           |
|              | 28 COLCHESTER AVE., BURLINGTON, EAST AVE., BURLINGTON                                                     | Minor Arterial (u)                            | Burlington       | 0.430 - 0.450 | 17120 | 5     | 41      | 0          | 8        | 33             | 0.808            | 1.312          | 1.624                    | \$22,559                           |
|              | 15 MAIN ST., BURLINGTON, ST. PAUL ST., BURLINGTON                                                         | Principal Arterial (u)/Urban Collector (u)    | Burlington       | 0.250 - 0.270 | 10565 | 5     | 34      | 1          | 9        | 25             | 0.98             | 1.763          | 1.799                    | \$68,900                           |
|              | 96 NORTH AVE., BURLINGTON, PLATTSBURG AVE., BURLINGTON                                                    | Minor Arterial (u)                            | Burlington       | 3.090 - 3.100 | 8700  | 5     | 16      | 0          | 3        | 13             | 0.923            | 1.007          | 1.091                    | \$22,025                           |
|              | 7 NORTH ST., BURLINGTON, N CHAMPLAIN ST., BURLINGTON                                                      | Principal Arterial (u)/Urban Collector (u)    | Burlington       | 0.220 - 0.240 | 6400  | 5     | 26      | 0          | 5        | 21             | 1.089            | 2.226          | 2.044                    | \$22,362                           |
|              | 90 N UNION ST., BURLINGTON, S UNION ST., BURLINGTON, <T0000>                                              | Principal Arterial (u)                        | Burlington       | 0.000 - 0.010 | 5435  | 5     | 14      | 0          | 3        | 11             | 1.278            | 1.411          | 1.104                    | \$23,900                           |
|              | 27 PARK ST., BURLINGTON, NORTH ST., BURLINGTON                                                            | Principal Arterial (u)/Urban Collector (u)    | Burlington       | 0.280 - 0.300 | 6135  | 5     | 20      | 0          | 4        | 16             | 1.099            | 1.786          | 1.625                    | \$22,900                           |
|              | 100 PARK ST., BURLINGTON, MANHATTAN DRIVE, BURLINGTON, VT. 127 BELTLINE, BURLINGTON                       | Freeway/Expressway (u)/Principal Arterial (u) | Burlington       | 0.480 - 0.490 | 14235 | 5     | 39      | 0          | 7        | 33             | 1.385            | 1.501          | 1.084                    | \$21,692                           |
|              | 41 PEARL ST., BURLINGTON, <T0000>, S PROSPECT ST., BURLINGTON, COLCHESTER AVE., BURLINGTON                | Minor Arterial (u)/Urban Collector (u)        | Burlington       | 0.930 - 0.940 | 20100 | 5     | 44      | 0          | 14       | 34             | 0.866            | 1.199          | 1.385                    | \$31,982                           |
|              | 130 W. ALLEN ST., WINOOSKI CITY, MALLETT'S BAY AVE., WINOOSKI CITY, <T0000>, W. CENTER ST., WINOOSKI CITY | Minor Arterial (u)/Urban Collector (u)        | Winooski City    | 0.000 - 0.010 | 2925  | 5     | 7       | 0          | 0        | 7              | 1.303            | 1.311          | 1.006                    | \$8,900                            |
|              | 32 PATCHEN ROAD, SOUTH BURLINGTON, WHITE ST., SOUTH BURLINGTON                                            | Urban Collector (u)                           | South Burlington | 0.080 - 0.100 | 12515 | 5     | 29      | 0          | 6        | 25             | 0.822            | 1.269          | 1.544                    | \$23,997                           |
|              | 13 SUSIE WILSON RD., ESSEX, KELLOGG ROAD, ESSEX                                                           | Urban Collector (u)                           | Essex            | 0.480 - 0.500 | 19720 | 5     | 51      | 0          | 2        | 49             | 0.754            | 1.417          | 1.877                    | \$11,645                           |
|              | 81 VT. 127 TH, COLCHESTER, PORTER POINT RD., COLCHESTER                                                   | Minor Arterial (u)/Urban Collector (u)        | Colchester       | 0.860 - 0.940 | 12650 | 5     | 25      | 0          | 6        | 20             | 0.941            | 1.082          | 1.151                    | \$26,056                           |
|              | 44 VT. 127 TH, COLCHESTER, W. LAKESHORE DR., COLCHESTER                                                   | Minor Arterial (u)                            | Colchester       | 2.170 - 2.230 | 9850  | 5     | 22      | 0          | 13       | 15             | 0.899            | 1.223          | 1.36                     | \$52,691                           |
|              | 105 VT. 127 TH, COLCHESTER, E. LAKESHORE DR., COLCHESTER                                                  | Minor Arterial (u)/Urban Collector (u)        | Colchester       | 3.170 - 3.250 | 13080 | 5     | 24      | 0          | 3        | 21             | 0.935            | 1.005          | 1.075                    | \$17,650                           |



FIGURE 5-A

## Vermont Agency of Transportation

## Statewide Sections - Route Log Order /2 - Statewide

Years: 2010 - 2014

| H.C.L.<br>No. | /3. Route                                     | System                 | Town         | Mileage       | ADT   | Years | Crashes | Fatalities | Injuries | PDO<br>Crashes | Critical<br>Rate | Actual<br>Rate | Ratio<br>Actual/Critical | Severity Index<br>(\$/Accident/1.) |
|---------------|-----------------------------------------------|------------------------|--------------|---------------|-------|-------|---------|------------|----------|----------------|------------------|----------------|--------------------------|------------------------------------|
|               | 472 GAGE ST., BENNINGTON                      | Urban Collector (u)    | Bennington   | 0.800 - 1.100 | 1663  | 5     | 8       | 0          | 1        | 7              | 7.586            | 8.786          | 1.158                    | \$17,650                           |
|               | 333 TOWN HWY. NO. 28 (KOCHER DR.), BENNINGTON | Urban Collector (u)    | Bennington   | 0.000 - 0.300 | 9220  | 5     | 35      | 0          | 8        | 29             | 5.229            | 6.933          | 1.326                    | \$25,409                           |
|               | 235 UNION ST., BENNINGTON                     | Urban Collector (u)    | Bennington   | 0.200 - 0.500 | 2000  | 5     | 12      | 0          | 3        | 11             | 7.249            | 10.958         | 1.512                    | \$27,883                           |
|               | 558 FAIRGROUND ROAD, BRATTLEBORO              | Urban Collector (u)    | Brattleboro  | 0.100 - 0.400 | 3500  | 5     | 13      | 0          | 3        | 10             | 6.358            | 6.784          | 1.067                    | \$25,054                           |
|               | 245 OAK GROVE AVE., BRATTLEBORO               | Urban Collector (u)    | Brattleboro  | 0.000 - 0.300 | 800   | 5     | 6       | 0          | 0        | 6              | 9.149            | 13.698         | 1.497                    | \$8,900                            |
|               | 278 SOUTH MAIN ST., BRATTLEBORO               | Urban Collector (u)    | Brattleboro  | 0.600 - 0.900 | 2900  | 5     | 15      | 0          | 2        | 14             | 6.636            | 9.447          | 1.424                    | \$18,827                           |
|               | 632 ALLEN ST., RUTLAND CITY                   | Minor Arterial (u)     | Rutland City | 0.100 - 0.400 | 8600  | 5     | 27      | 0          | 8        | 22             | 5.674            | 5.734          | 1.011                    | \$30,630                           |
|               | 52 CHURCH ST., RUTLAND CITY                   | Urban Collector (u)    | Rutland City | 0.100 - 0.400 | 1330  | 5     | 13      | 0          | 5        | 10             | 8.025            | 17.852         | 2.224                    | \$37,192                           |
|               | 619 CRESCENT ST., RUTLAND CITY                | Urban Collector (u)    | Rutland City | 0.400 - 0.700 | 4460  | 5     | 15      | 0          | 4        | 12             | 6.031            | 6.142          | 1.019                    | \$28,160                           |
|               | 630 FOREST ST., RUTLAND CITY                  | Urban Collector (u)    | Rutland City | 0.500 - 0.800 | 2667  | 5     | 10      | 0          | 6        | 8              | 6.767            | 6.848          | 1.012                    | \$54,460                           |
|               | 206 LINCOLN AVE., RUTLAND CITY                | Urban Collector (u)    | Rutland City | 0.100 - 0.400 | 1090  | 5     | 8       | 1          | 3        | 5              | 8.445            | 13.405         | 1.587                    | \$211,400                          |
|               | 443 LINCOLN AVE., RUTLAND CITY                | Urban Collector (u)    | Rutland City | 0.400 - 0.700 | 1090  | 5     | 6       | 0          | 1        | 5              | 8.445            | 10.054         | 1.19                     | \$20,567                           |
|               | 221 STRONGS AVE., RUTLAND CITY                | Principal Arterial (u) | Rutland City | 0.200 - 0.500 | 8823  | 5     | 53      | 1          | 15       | 40             | 7.159            | 10.971         | 1.532                    | \$55,651                           |
|               | 562 WEST ST., RUTLAND CITY                    | Principal Arterial (u) | Rutland City | 0.400 - 0.700 | 10615 | 5     | 43      | 0          | 14       | 33             | 6.951            | 7.398          | 1.064                    | \$32,519                           |
|               | 91 COLCHESTER AVE., BURLINGTON                | Minor Arterial (u)     | Burlington   | 0.100 - 0.400 | 16012 | 5     | 89      | 0          | 20       | 72             | 5.126            | 10.152         | 1.981                    | \$24,930                           |
|               | 63 EAST AVE., BURLINGTON                      | Minor Arterial (u)     | Burlington   | 0.000 - 0.300 | 8328  | 5     | 56      | 0          | 10       | 47             | 5.707            | 12.281         | 2.152                    | \$21,559                           |
|               | 519 NORTH AVE., BURLINGTON                    | Minor Arterial (u)     | Burlington   | 0.000 - 0.300 | 10553 | 5     | 35      | 0          | 6        | 30             | 5.476            | 6.057          | 1.106                    | \$21,154                           |
|               | 126 NORTH AVE., BURLINGTON                    | Minor Arterial (u)     | Burlington   | 1.900 - 2.200 | 13258 | 5     | 70      | 0          | 13       | 59             | 5.276            | 9.643          | 1.828                    | \$22,154                           |
|               | 369 NORTH AVE., BURLINGTON                    | Minor Arterial (u)     | Burlington   | 2.200 - 2.500 | 13313 | 5     | 49      | 0          | 9        | 41             | 5.273            | 6.722          | 1.275                    | \$21,939                           |
|               | 398 NORTH AVE., BURLINGTON                    | Minor Arterial (u)     | Burlington   | 2.600 - 2.900 | 10800 | 5     | 40      | 0          | 6        | 34             | 5.455            | 6.764          | 1.24                     | \$19,400                           |
|               | 4 PEARL ST., BURLINGTON                       | Minor Arterial (u)     | Burlington   | 0.000 - 0.300 | 8045  | 5     | 104     | 0          | 5        | 100            | 5.743            | 23.611         | 4.111                    | \$12,351                           |
|               | 319 PINE ST., BURLINGTON                      | Minor Arterial (u)     | Burlington   | 0.200 - 0.500 | 11800 | 5     | 47      | 0          | 13       | 35             | 5.376            | 7.274          | 1.353                    | \$28,451                           |

FIGURE 5-A

## Vermont Agency of Transportation

## Statewide Sections - Route Log Order /2 - Statewide

Years: 2010 - 2014

| H.C.L.<br>No. | /3. Route                            | System                 | Town             | Mileage       | ADT   | Years | Crashes | Fatalities | Injuries | PDO<br>Crashes | Critical<br>Rate | Actual<br>Rate | Ratio<br>Actual/Critical | Severity Index<br>(\$/Accident/1.) |
|---------------|--------------------------------------|------------------------|------------------|---------------|-------|-------|---------|------------|----------|----------------|------------------|----------------|--------------------------|------------------------------------|
|               | 440 PINE ST., BURLINGTON             | Minor Arterial (u)     | Burlington       | 0.800 - 1.100 | 10580 | 5     | 38      | 0          | 6        | 32             | 5.474            | 6.56           | 1.198                    | \$19,953                           |
|               | 40 PINE ST., BURLINGTON              | Minor Arterial (u)     | Burlington       | 1.100 - 1.400 | 7175  | 5     | 53      | 0          | 9        | 45             | 5.865            | 13.491         | 2.3                      | \$20,955                           |
|               | 32 ST. PAUL ST., BURLINGTON          | Urban Collector (u)    | Burlington       | 0.000 - 0.300 | 9400  | 5     | 65      | 0          | 14       | 52             | 5.211            | 12.629         | 2.423                    | \$24,114                           |
|               | 629 S UNION ST., BURLINGTON          | Principal Arterial (u) | Burlington       | 0.000 - 0.300 | 3100  | 5     | 15      | 0          | 2        | 13             | 8.719            | 8.837          | 1.014                    | \$18,233                           |
|               | 130 S UNION ST., BURLINGTON          | Principal Arterial (u) | Burlington       | 0.500 - 0.800 | 3858  | 5     | 32      | 0          | 8        | 26             | 8.331            | 15.149         | 1.818                    | \$26,956                           |
|               | 638 E SPRING ST., WINOOSKI CITY      | Urban Collector (u)    | Winooski City    | 0.100 - 0.400 | 5700  | 5     | 18      | 0          | 2        | 16             | 5.731            | 5.767          | 1.006                    | \$16,678                           |
|               | 80 MALLETT'S BAY AVE., WINOOSKI CITY | Minor Arterial (u)     | Winooski City    | 0.100 - 0.400 | 3738  | 5     | 28      | 0          | 4        | 24             | 6.693            | 13.681         | 2.044                    | \$18,900                           |
|               | 115 W SPRING ST., WINOOSKI CITY      | Urban Collector (u)    | Winooski City    | 0.000 - 0.300 | 3302  | 5     | 22      | 1          | 5        | 18             | 6.442            | 12.169         | 1.889                    | \$89,305                           |
|               | 384 DORSET ST., SOUTH BURLINGTON     | Urban Collector (u)    | South Burlington | 3.100 - 3.400 | 12582 | 5     | 43      | 0          | 9        | 36             | 4.957            | 6.242          | 1.259                    | \$23,965                           |
|               | 11 DORSET ST., SOUTH BURLINGTON      | Urban Collector (u)    | South Burlington | 3.700 - 4.000 | 14475 | 5     | 120     | 0          | 11       | 111            | 4.847            | 15.141         | 3.124                    | \$15,465                           |
|               | 524 SPEAR ST., SOUTH BURLINGTON      | Minor Arterial (u)     | South Burlington | 1.800 - 2.100 | 5047  | 5     | 19      | 0          | 2        | 17             | 6.283            | 6.876          | 1.094                    | \$16,268                           |
|               | 437 SWIFT ST., SOUTH BURLINGTON      | Urban Collector (u)    | South Burlington | 0.900 - 1.200 | 6213  | 5     | 23      | 0          | 1        | 22             | 5.633            | 6.761          | 1.2                      | \$11,943                           |
|               | 144 SUSIE WILSON RD., ESSEX          | Urban Collector (u)    | Essex            | 0.000 - 0.300 | 17453 | 5     | 80      | 0          | 15       | 67             | 4.71             | 8.372          | 1.777                    | \$22,248                           |
|               | 282 BEAR TRAP ROAD, MILTON           | Urban Collector (u)    | Milton           | 0.000 - 0.300 | 860   | 5     | 6       | 0          | 2        | 4              | 8.979            | 12.742         | 1.419                    | \$32,233                           |
|               | 46 JACKSON ROAD, MILTON              | Urban Collector (u)    | Milton           | 1.000 - 1.300 | 460   | 5     | 6       | 0          | 1        | 5              | 10.548           | 23.823         | 2.258                    | \$20,567                           |
|               | 305 MAIN ST.(WESTFORD RD)., MILTON   | Urban Collector (u)    | Milton           | 0.600 - 0.900 | 2287  | 5     | 12      | 0          | 8        | 6              | 7.017            | 9.583          | 1.366                    | \$57,050                           |
|               | 604 MIDDLE ROAD, MILTON              | Urban Collector (u)    | Milton           | 2.600 - 2.900 | 2961  | 5     | 11      | 0          | 3        | 9              | 6.604            | 6.785          | 1.027                    | \$28,800                           |
|               | 634 SEYMOUR ST., MIDDLEBURY          | Urban Collector (u)    | Middlebury       | 0.300 - 0.600 | 1670  | 5     | 7       | 0          | 0        | 7              | 7.578            | 7.655          | 1.01                     | \$8,900                            |
|               | 421 WASHINGTON ST., MIDDLEBURY       | Urban Collector (u)    | Middlebury       | 0.000 - 0.300 | 4158  | 5     | 17      | 0          | 0        | 17             | 6.122            | 7.467          | 1.22                     | \$8,900                            |
|               | 487 BROOK ST., BARRE CITY            | Urban Collector (u)    | Barre City       | 0.000 - 0.300 | 1160  | 5     | 6       | 0          | 0        | 6              | 8.311            | 9.447          | 1.137                    | \$8,900                            |
|               | 213 HILL ST., BARRE CITY             | Urban Collector (u)    | Barre City       | 0.000 - 0.300 | 3500  | 5     | 19      | 0          | 6        | 15             | 6.358            | 9.915          | 1.559                    | \$31,942                           |
|               | 322 MERCHANT ST., BARRE CITY         | Urban Collector (u)    | Barre City       | 0.000 - 0.300 | 2339  | 5     | 12      | 0          | 2        | 10             | 6.98             | 9.37           | 1.342                    | \$20,567                           |

FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                 | Surface Condition | Crash Type           | Traffic Signals                       | Intersection With  | Dir. of Collision                                              |
|-----------|------------|--------|--------------------------------|-------------------|----------------------|---------------------------------------|--------------------|----------------------------------------------------------------|
| 5         | 5/20/2011  | 0      | FAU-5036 Park Street           | Dry               | Property Damage Only | No Control                            | Pearl Street       | Rear End                                                       |
| 5         | 10/4/2012  | 0      | FAU-5036 Park Street           | Wet               | Injury               | Traffic Signal (Flashing)             | Pearl Street       | Rear End                                                       |
| 5         | 12/4/2014  | 0      | FAU-5036 Park St               | Dry               | Property Damage Only | No Control                            | Pearl St           | Rear End                                                       |
| 5         | 9/17/2011  | 0      | FAU 5038 (Pearl Street)        | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Same Direction Sideswipe                                       |
| 5         | 5/18/2012  | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Same Direction Sideswipe                                       |
| 5         | 7/30/2012  | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Same Direction Sideswipe                                       |
| 5         | 8/1/2012   | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | No Control                            | Battery St         | Same Direction Sideswipe                                       |
| 5         | 10/8/2012  | 0      | FAU-5038 Pearl Street          | Dry               | Property Damage Only | Traffic Signal                        | Battery Street     | Same Direction Sideswipe                                       |
| 5         | 1/22/2013  | 0      | FAU-5038 Pearl St              | Wet               | Property Damage Only | Traffic Signal                        | Battery St         | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 5         | 4/6/2013   | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | No Control                            | Battery St         | Rear-to-rear                                                   |
| 5         | 4/22/2013  | 0      | FAU-5038 Pearl St/Battery St   | Dry               | Property Damage Only | No Control                            | Battery St         | Rear End                                                       |
| 5         | 5/8/2013   | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 5         | 4/18/2014  | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Same Direction Sideswipe                                       |
| 5         | 6/8/2014   | 0      | FAU-5038 Pearl St              |                   | Property Damage Only | No Control                            | Park St            | Same Direction Sideswipe                                       |
| 5         | 1/13/2015  | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 5         | 4/9/2015   | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 5         | 4/29/2015  | 0      | Pearl St                       | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Right Turn, Same Direction, Rear End ^~^--                     |
| 5         | 9/6/2015   | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | No Control                            | Battery St         | Same Direction Sideswipe                                       |
| 5         | 11/23/2015 | 0      | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal                        | Battery St         | Same Direction Sideswipe                                       |
| 5         | 8/16/2012  | 0.01   | FAU-5038 Pearl St              | Dry               | Property Damage Only | No Control                            | Battery St         | Same Direction Sideswipe                                       |
| 5         | 7/27/2013  | 0.01   | FAU-5038 (240 Pearl St)        | Dry               | Unknown              | No Control                            | North Union Street | Rear-to-rear                                                   |
| 5         | 4/18/2012  | 0.02   | FAU-5038 (12 Pearl St)         | Dry               | Property Damage Only | No Control                            | Battery St         | Unknown                                                        |
| 5         | 4/25/2014  | 0.54   | FAU-5008 Battery St            | Dry               | Property Damage Only | No Control                            | Pearl St           | Unknown                                                        |
| 5         | 1/11/2011  | 0.55   | FAU 5008 (Battery Street)      | Wet               | Property Damage Only | Traffic Signal                        | Pearl St           | Same Direction Sideswipe                                       |
| 5         | 4/14/2011  | 0.55   | FAU-5008 Battery St.           | Dry               | Property Damage Only | No Control                            | Pearl St.          | Unknown                                                        |
| 5         | 7/16/2011  | 0.55   | FAU 5008 (Battery St)          | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Rear End                                                       |
| 5         | 9/7/2011   | 0.55   | FAU 5008 (Battery St/Pearl St) | Wet               | Property Damage Only | Traffic Signal                        | Park St            | No Turns, Thru moves only, Broadside ^<                        |
| 5         | 12/5/2011  | 0.55   | FAU 5008 Battery St            | Wet               | Property Damage Only | Traffic Signal                        | Pearl St           | Rear End                                                       |
| 5         | 5/19/2012  | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | All-way Flasher (Red on Cross Street) | Pearl St           | Single Vehicle Crash                                           |
| 5         | 8/12/2012  | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Left Turn and Thru, Angle Broadside -->v--                     |
| 5         | 11/6/2012  | 0.55   | FAU-5008 Battery Street        | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Rear End                                                       |
| 5         | 6/6/2013   | 0.55   | FAU 5008 Battery St            | Wet               | Property Damage Only | Traffic Signal                        | Pearl St           | Rear End                                                       |
| 5         | 6/17/2013  | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | No Control                            | Pearl St           | Same Direction Sideswipe                                       |
| 5         | 8/28/2014  | 0.55   | Battery St                     | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 5         | 10/28/2014 | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | No Control                            | Pearl St           | Rear End                                                       |
| 5         | 1/8/2015   | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Rear End                                                       |
| 5         | 5/28/2015  | 0.55   | Battery St                     | Dry               | Property Damage Only | unknown                               | Pearl St           | No Turns, Thru moves only, Broadside ^<                        |
| 5         | 7/25/2015  | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Same Direction Sideswipe                                       |
| 5         | 8/21/2015  | 0.55   | FAU-5008 Battery St            | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Same Direction Sideswipe                                       |
| 5         | 8/21/2015  | 0.55   | Battery st                     | Dry               | Property Damage Only | Traffic Signal                        | Park St            | Rear End                                                       |
| 5         | 9/22/2015  | 0.55   | Battery St                     | Dry               | Property Damage Only | No Control                            | Pearl St           | Rear End                                                       |
| 5         | 10/20/2015 | 0.55   | Battery St                     | Dry               | Property Damage Only | Traffic Signal                        | Pearl St           | Same Direction Sideswipe                                       |
| 6         | 12/15/2011 | 0.13   | FAU-5038 (58 Pearl St)         | Dry               | Property Damage Only | No Control                            | N Champlain St     | Unknown                                                        |
| 6         | 8/18/2012  | 0.13   | FAU-5038 (58 Pearl St)         | Dry               | Property Damage Only | No Control                            | N Champlain St     | Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--  |
| 6         | 8/22/2012  | 0.13   | FAU-5038 (58 Pearl St)         | Dry               | Property Damage Only | No Control                            | North Champlain    | Unknown                                                        |
| 6         | 10/21/2012 | 0.13   | FAU-5038 (58 Pearl St)         | Dry               | Property Damage Only | No Control                            | Boves              | Same Direction Sideswipe                                       |
| 6         | 12/23/2013 | 0.13   | FAU-5038 (58 Pearl St)         | Snow              | Property Damage Only | No Control                            | Pine St            | Same Direction Sideswipe                                       |

Report results from the online Public Query Tool may not match exactly with those obtained directly from VTrans Crash staff due to the nuances of reporting mechanisms.



FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address              | Surface Condition | Crash Type           | Traffic Signals              | Intersection With     | Dir. of Collision                                              |
|-----------|------------|--------|-----------------------------|-------------------|----------------------|------------------------------|-----------------------|----------------------------------------------------------------|
| 6         | 6/30/2014  | 0.15   | 72 Pearl St                 | Dry               | Property Damage Only | No Control                   | Pine St               | Same Direction Sideswipe                                       |
| 6         | 1/19/2011  | 0.16   | FAU 5038 (90 Pearl Street)  | Slush             | Property Damage Only | Traffic Signal               |                       | Rear End                                                       |
| 6         | 6/20/2011  | 0.16   | FAU-5038 (90 Pearl St)      | Dry               | Property Damage Only | Traffic Signal               | Pine St               | Same Direction Sideswipe                                       |
| 6         | 8/27/2012  | 0.16   | FAU-5038 (84 Pearl St)      | Dry               | Property Damage Only | No Control                   | Pine St/Pearl St      | Same Direction Sideswipe                                       |
| 6         | 1/11/2013  | 0.16   | FAU-5038 Pearl Street       | Wet               | Property Damage Only | Traffic Signal               | Pine Street           | Rear-to-rear                                                   |
| 6         | 12/13/2013 | 0.16   | FAU-5038 Pearl St./Pine St  | Unknown           | Property Damage Only | unknown                      | Pearl St              | Unknown                                                        |
| 6         | 6/3/2014   | 0.16   | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | Pine St               | Rear End                                                       |
| 6         | 10/22/2014 | 0.16   | Pearl St                    | Wet               | Property Damage Only | No Control                   | Pine St               | Same Direction Sideswipe                                       |
| 6         | 12/29/2014 | 0.16   | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | Pine St               | No Turns, Thru moves only, Broadside ^<                        |
| 6         | 12/30/2014 | 0.16   | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | Pine St               | Same Direction Sideswipe                                       |
| 6         | 3/9/2015   | 0.16   | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | Pine St               | No Turns, Thru moves only, Broadside ^<                        |
| 6         | 7/18/2015  | 0.16   | Pearl St                    | Dry               | Injury               | Traffic Signal               | PineSt                | Rear End                                                       |
| 6         | 10/31/2015 | 0.16   | Pearl St                    | Dry               | Property Damage Only | Traffic Signal (Flashing)    | Pine St               | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 6         | 6/11/2011  | 0.17   | FAU-5038 (83 Pearl Street)  | Dry               | Property Damage Only | Traffic Signal               | Pine Street           | Rear End                                                       |
| 6         | 6/29/2011  | 0.17   | FAU 5038 (77 Pearl St)      | Dry               | Property Damage Only | No Control                   | 77 Pearl St           | Rear End                                                       |
| 6         | 5/24/2014  | 0.18   | FAU-5038 (85 Pearl St)      | Dry               | Property Damage Only | No Control                   | George                | Rear End                                                       |
| 6         | 8/12/2015  | 0.18   | 90 Pearl St                 | Dry               | Property Damage Only | Traffic Signal               | Pine Street           | Rear End                                                       |
| 7         | 4/26/2012  | 0.37   | FAU-5038 (185 Pearl St)     | Wet               | Property Damage Only | No Control                   | Clarke St             | Same Direction Sideswipe                                       |
| 7         | 3/4/2011   | 0.38   | FAU 5038 (187 Pearl Street) | Dry               | Property Damage Only | No Control                   |                       | Rear End                                                       |
| 7         | 10/8/2014  | 0.38   | Pearl St                    | Unknown           | Property Damage Only | No Control                   | S Winooski Ave        | Unknown                                                        |
| 7         | 12/21/2015 | 0.38   | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | N Winooski            | Rear End                                                       |
| 7         | 9/14/2011  | 0.39   | FAU 5038 (Pearl Street)     | Dry               | Property Damage Only | Traffic Signal               | S Winooski Ave        | Rear End                                                       |
| 7         | 12/19/2012 | 0.39   | FAU-5038 Pearl Street       | Wet               | Property Damage Only | No Control                   | Winooski Avenue       | Rear End                                                       |
| 7         | 10/10/2014 | 0.39   | Pearl St                    | Dry               | Property Damage Only | Traffic Signal               | S Winooski Ave        | Unknown                                                        |
| 7         | 3/17/2015  | 0.39   | FAU-5038 Pearl St           | Dry               | Injury               | No Control                   | S Winooski Ave        | Rear End                                                       |
| 7         | 3/31/2015  | 0.39   | Pearl St                    | Dry               | Property Damage Only | Traffic Signal               | S Winooski Ave        | Rear End                                                       |
| 7         | 5/19/2015  | 0.39   | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | S Winooski Ave        | Rear End                                                       |
| 7         | 2/19/2011  | 0.4    | FAU 5038 (Pearl Street)     | Dry               | Property Damage Only | Traffic Signal               | S Winooski Ave        | Rear End                                                       |
| 7         | 7/24/2011  | 0.4    | FAU 5038 (Pearl Street)     | Dry               | Property Damage Only | Traffic Signal               | S Winooski Ave        | Same Direction Sideswipe                                       |
| 7         | 3/17/2012  | 0.4    | FAU 5038 (Pearl Street)     | Dry               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Same Direction Sideswipe                                       |
| 7         | 4/14/2012  | 0.4    | FAU-5038 Pearl St           | Dry               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Rear End                                                       |
| 7         | 8/21/2012  | 0.4    | FAU-5038 Pearl St           | Dry               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Rear End                                                       |
| 7         | 9/22/2012  | 0.4    | FAU-5038 Pearl St           | Wet               | Injury               | Traffic Signal               | S Winooski Ave        | Unknown                                                        |
| 7         | 7/11/2013  | 0.4    | FAU-5038 Pearl St           | Dry               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Rear End                                                       |
| 7         | 8/30/2013  | 0.4    | FAU-5038 Pearl St           |                   | Injury               | unknown                      | N Winooski            | Unknown                                                        |
| 7         | 1/22/2014  | 0.4    | FAU-5038 Pearl St           | Wet               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Rear End                                                       |
| 7         | 7/29/2014  | 0.4    | FAU-5038 Pearl St           | Dry               | Property Damage Only | Traffic Signal               | S Winooski Ave        | Rear End                                                       |
| 7         | 8/13/2014  | 0.4    | Pearl St                    | Wet               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Rear End                                                       |
| 7         | 11/20/2014 | 0.4    | FAU-5038 Pearl St           | Dry               | Property Damage Only | No Control                   | S Winooski            | Same Direction Sideswipe                                       |
| 7         | 12/16/2014 | 0.4    | FAU-5038 Pearl St           | Dry               | Injury               | All-way Flasher (Red on All) | N Winooski Ave        | Left Turn and Thru, Broadside v<--                             |
| 7         | 12/31/2014 | 0.4    | Pearl St                    | Dry               | Property Damage Only | Traffic Signal               | N Winooski Ave        | Rear End                                                       |
| 7         | 10/31/2015 | 0.4    | FAU-5038 Pearl St           | Dry               | Injury               | Traffic Signal               | n Winooski Ave        | Head On                                                        |
| 7         | 4/8/2013   | 0.41   | FAU-5038 Pearl Street       | Dry               | Property Damage Only | Traffic Signal               | North Winooski Avenue | Rear End                                                       |
| 7         | 4/23/2013  | 0.42   | FAU-5038 (198 Pearl Street) | Dry               | Property Damage Only | Traffic Signal               | South Winooski Avenue | Rear End                                                       |
| 7         | 8/31/2011  | 1.31   | ALTUS-7 (S Winooski Ave)    | Dry               | Property Damage Only | Traffic Signal               | Pearl St              | Same Direction Sideswipe                                       |
| 7         | 10/28/2011 | 1.319  | ALTUS-7 (S Winooski Ave)    | Dry               | Injury               | No Control                   | Pearl St              | Same Direction Sideswipe                                       |
| 7         | 1/11/2011  | 1.32   | ALTUS-7 (N Winooski )       | Dry               | Property Damage Only | Traffic Signal               | Pearl Street          | Left Turn and Thru, Angle Broadside -->v--                     |

Report results from the online Public Query Tool may not match exactly with those obtained directly from VTrans Crash staff due to the nuances of reporting mechanisms.

FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                           | Surface Condition    | Crash Type           | Traffic Signals                       | Intersection With     | Dir. of Collision                                   |
|-----------|------------|--------|------------------------------------------|----------------------|----------------------|---------------------------------------|-----------------------|-----------------------------------------------------|
| 7         | 1/23/2011  | 1.32   | ALTUS-7 (S Winooski Ave)                 | Explain in Narrative | Injury               | Traffic Signal                        | Pearl Street          | Head On                                             |
| 7         | 2/4/2011   | 1.32   | ALTUS-7 (S Winooski Ave)                 | Snow                 | Property Damage Only | Traffic Signal                        | Pearl Street          | Head On                                             |
| 7         | 7/3/2011   | 1.32   | ALTUS-7 (S Winooski Ave)                 | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Unknown                                             |
| 7         | 9/13/2011  | 1.32   | Alt. US-7 N. Winooski Ave./Pearl St      | Dry                  | Injury               | Traffic Signal                        | N Winooski Ave        | Opp Direction Sideswipe                             |
| 7         | 4/1/2012   | 1.32   | Alt. US-7 N Winooski Ave/Pearl St        | Dry                  | Property Damage Only | Traffic Signal                        | N Winooski Ave        | Opp Direction Sideswipe                             |
| 7         | 4/15/2012  | 1.32   | Alt. US-7 N Winooski Ave                 | Dry                  | Property Damage Only | No Control                            | Pearl St              | Opp Direction Sideswipe                             |
| 7         | 5/4/2012   | 1.32   | Alt. US-7 S Winooski Ave                 | Wet                  | Injury               | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 7/29/2012  | 1.32   | Alt. US-7 N Winooski Ave/Pearl St        | Dry                  | Injury               | Traffic Signal                        | N Winooski Ave        | Left Turn and Thru, Angle Broadside -->v--          |
| 7         | 7/29/2012  | 1.32   | Alt. US-7 S Winooski Ave                 | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 1/24/2013  | 1.32   | Alt. US-7N. Winooski Avenue/Pearl Street | Dry                  | Property Damage Only | No Control                            | North Winooski Avenue | Same Direction Sideswipe                            |
| 7         | 3/3/2013   | 1.32   | Alt. US-7 S. Winooski Ave./Pearl St.     | Dry                  | Property Damage Only | Traffic Signal                        | South Winooski Avenue | Head On                                             |
| 7         | 4/15/2013  | 1.32   | Alt. US-7 South Winooski Avenue          |                      | Property Damage Only | unknown                               | Pearl Street          | Rear End                                            |
| 7         | 7/19/2013  | 1.32   | Alt. US-7 N Winooski Ave                 | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Left Turn and Thru, Angle Broadside -->v--          |
| 7         | 9/20/2013  | 1.32   | Alt. US-7 N. Winooski Av./Pearl St       | Dry                  | Property Damage Only | Traffic Signal                        | N Winooski Ave        | Unknown                                             |
| 7         | 9/27/2013  | 1.32   | Alt. US-7 N Winooski Ave                 | Unknown              | Property Damage Only | unknown                               | Pearl St              | Same Direction Sideswipe                            |
| 7         | 10/29/2013 | 1.32   | Alt. US-7 No Winooski Ave                | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 11/1/2013  | 1.32   | Alt. US-7 N Winooski Ave/Pearl St        |                      | Injury               | unknown                               | N Winooski Ave        | Unknown                                             |
| 7         | 11/10/2013 | 1.32   | N Winooski Ave                           | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Same Direction Sideswipe                            |
| 7         | 1/13/2014  | 1.32   | Alt. US-7 S Winooski Ave                 | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Same Direction Sideswipe                            |
| 7         | 3/7/2014   | 1.32   | Alt. US-7 S Winooski Ave                 | Wet                  | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 3/16/2014  | 1.32   | Alt. US-7 S. Winooski Ave./Pearl St      | Dry                  | Injury               | Traffic Signal                        | S Winooski Ave        | Left Turn and Thru, Angle Broadside -->v--          |
| 7         | 4/26/2014  | 1.32   | St Paul St                               | Wet                  | Property Damage Only | No Control                            | Pearl St              | Rear End                                            |
| 7         | 5/14/2014  | 1.32   | Alt. US-7 S Winooski Ave                 | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 5/26/2014  | 1.32   | Alt. US-7 S Winooski Ave                 | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Head On                                             |
| 7         | 7/2/2014   | 1.32   | Alt. US-7 S. Winooski Av./Pearl St       | Dry                  | Property Damage Only | Traffic Signal                        | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<             |
| 7         | 9/20/2014  | 1.32   | S Winooski                               | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 12/27/2014 | 1.32   | Alt. US-7 S Winooski/Pearl St            | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St/S Winooski   | Left and Right Turns, Simultaneous Turn Crash --v-- |
| 7         | 4/6/2015   | 1.32   | Alt. US-7 S Winooski Ave                 | Dry                  | Property Damage Only | No Control                            | Pearl St              | Same Direction Sideswipe                            |
| 7         | 5/4/2015   | 1.32   | Alt. US-7 S. Winooski Av./Pearl St       | Dry                  | Property Damage Only | Traffic Signal                        | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<             |
| 7         | 5/14/2015  | 1.32   | Alt. US-7 N. Winoosk Av./Pearl St        | Dry                  | Property Damage Only | Traffic Signal                        | N Winooski Ave        | Rear End                                            |
| 7         | 7/15/2015  | 1.32   | Alt. US-7 N Winooski Av./Pearl St        | Dry                  | Property Damage Only | Traffic Signal                        | N Winooski Ave        | Rear End                                            |
| 7         | 9/6/2015   | 1.32   | N Winooski Ave                           | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Same Direction Sideswipe                            |
| 7         | 10/7/2015  | 1.32   | Alt. US-7 S. Winooski Av./Pearl St       | Dry                  | Property Damage Only | Traffic Signal                        | S Winooski Ave        | Rear End                                            |
| 7         | 10/18/2015 | 1.32   | N Winooski Ave                           | Dry                  | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                            |
| 7         | 11/20/2015 | 1.32   | Alt. US 7 N Winooski Ave                 | Dry                  | Property Damage Only | No Control                            | Pearl St              | Unknown                                             |
| 7         | 11/8/2012  | 1.33   | Alt. US-7 N Winooski Ave                 | Dry                  | Injury               | No Control                            | Pearl St              | Single Vehicle Crash                                |
| 7         | 8/9/2013   | 1.34   | Alt. US-7 S Winooski Ave                 | Wet                  | Property Damage Only | No Control                            | Pearl St              | Same Direction Sideswipe                            |
| 7         | 7/2/2013   | 1.35   | Alt. US-7 (15 N Winooski Ave)            |                      | Property Damage Only | unknown                               | Pearl St.             | Unknown                                             |
| 7         | 9/22/2014  | 1.35   | Alt. US-7 N Winooski Ave                 | Dry                  | Property Damage Only | No Control                            | Pearl St              | Same Direction Sideswipe                            |
| 7         | 10/21/2014 | 1.35   | Alt. US-7 (14 N Winooski Ave)            | Dry                  | Property Damage Only | No Control                            | N Winooski Ave        | Same Direction Sideswipe                            |
| 8         | 6/24/2012  | 0.46   | FAU-5038 Pearl St                        | Dry                  | Property Damage Only | No Control                            | South Union St        | Same Direction Sideswipe                            |
| 8         | 6/15/2013  | 0.46   | FAU-5038 Pearl St                        | Dry                  | Property Damage Only | No Control                            | Orchard Terr          | Unknown                                             |
| 8         | 9/3/2014   | 0.46   | FAU-5038 Pearl St                        | Dry                  | Property Damage Only | No Control                            | Orchard Ter           | Rear-to-rear                                        |
| 8         | 9/30/2012  | 0.47   | FAU-5038 (223 Pearl St)                  | Unknown              | Property Damage Only | No Control                            | #1                    | Unknown                                             |
| 8         | 2/13/2012  | 0.48   | FAU 5038 (Pearl Street)                  | Wet                  | Property Damage Only | All-way Flasher (Red on Cross Street) | So Union St           | No Turns, Thru moves only, Broadside ^<             |
| 8         | 2/5/2014   | 0.48   | FAU-5038 Pearl St                        | Snow                 | Property Damage Only | Traffic Signal                        | S Winooski Ave        | Rear End                                            |
| 8         | 9/21/2011  | 0.489  | FAU 5038 (Pearl Street)                  | Dry                  | Property Damage Only | No Control                            | N Union St            | Rear End                                            |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address          | Surface Condition | Crash Type           | Traffic Signals                       | Intersection With  | Dir. of Collision                                             |
|-----------|------------|--------|-------------------------|-------------------|----------------------|---------------------------------------|--------------------|---------------------------------------------------------------|
| 8         | 9/25/2011  | 0.489  | FAU 5038 (Pearl Street) | Dry               | Injury               | Traffic Signal (Normal Operation)     | S Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 2/25/2011  | 0.49   | FAU 5038 (Pearl Street) | Snow              | Property Damage Only | No Control                            | N Union Street     | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 6/2/2011   | 0.49   | FAU 5038 (Pearl Street) | Dry               | Property Damage Only | No Control                            | N. Union St.       | Rear End                                                      |
| 8         | 6/5/2011   | 0.49   | FAU 5038 (Pearl Street) | Dry               | Property Damage Only | All-way Flasher (Red on Cross Street) | North Union Street | Left Turn and Thru, Angle Broadside -->v--                    |
| 8         | 6/20/2011  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union St         | Same Direction Sideswipe                                      |
| 8         | 12/10/2011 | 0.49   | FAU-5038 Pearl Street   | Dry               | Property Damage Only | All-way Flasher (Red on Cross Street) | N Union St         | Same Direction Sideswipe                                      |
| 8         | 12/15/2011 | 0.49   | FAU-5038 Pearl St       | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 12/30/2011 | 0.49   | FAU-5038 Pearl St       | Unknown           | Property Damage Only | Traffic Signal (Flashing)             | N Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 4/11/2012  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | unknown                               | N Union St         | Same Direction Sideswipe                                      |
| 8         | 8/30/2012  | 0.49   | FAU-5038 Pearl St       | Dry               | Injury               | No Control                            | No Union St        | Unknown                                                       |
| 8         | 10/3/2012  | 0.49   | FAU-5038 Pearl St       | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | S Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 10/20/2012 | 0.49   | FAU-5038 Pearl Street   | Wet               | Injury               | All-way Flasher (Red on Cross Street) | North Union Street | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 10/24/2012 | 0.49   | FAU-5038 (240 Pearl St) | Dry               | Property Damage Only | No Control                            | N Union St         | Opp Direction Sideswipe                                       |
| 8         | 1/4/2013   | 0.49   | FAU-5038 Pearl Street   | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | South Union Street | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 1/26/2013  | 0.49   | FAU-5038 Pearl Street   | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | North Union Street | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 2/5/2013   | 0.49   | FAU-5038 Pearl Street   | Dry               | Injury               | Traffic Signal (Normal Operation)     | South Union Street | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 2/7/2013   | 0.49   | FAU-5038 Pearl Street   | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | North Union Street | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 3/1/2013   | 0.49   | FAU-5038 Pearl Street   | Dry               | Injury               | Traffic Signal (Normal Operation)     | North Union Street | Left Turn and Thru, Broadside v<--                            |
| 8         | 3/6/2013   | 0.49   | FAU-5038 Pearl Street   | Dry               | Injury               | Traffic Signal (Normal Operation)     | North Union Street | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 3/17/2013  | 0.49   | FAU-5038 Pearl St       | Dry               | Injury               | unknown                               | S Union St         | Unknown                                                       |
| 8         | 3/20/2013  | 0.49   | FAU-5038 Pearl St       | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union St         | Rear End                                                      |
| 8         | 3/30/2013  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 5/15/2013  | 0.49   | FAU-5038 Pearl St       | Dry               | Injury               | Traffic Signal (Normal Operation)     | South Willard St   | Rear End                                                      |
| 8         | 5/16/2013  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | North Union St     | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 5/23/2013  | 0.49   | FAU-5038 Pearl St       | Dry               | Injury               | Traffic Signal (Normal Operation)     | S Union St         | Left Turn and Thru, Angle Broadside -->v--                    |
| 8         | 9/1/2013   | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | S Union St         | Rear End                                                      |
| 8         | 9/8/2013   | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | S Union St         | Same Direction Sideswipe                                      |
| 8         | 10/3/2013  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | No Control                            | N Union St         | Unknown                                                       |
| 8         | 5/19/2014  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | No Control                            | N Union St         | Rear-to-rear                                                  |
| 8         | 6/2/2014   | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | No Control                            | N Union St         | Unknown                                                       |
| 8         | 10/14/2014 | 0.49   | fau-5038 Pearl St       | Dry               | Property Damage Only | No Control                            | N Union            | Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv-- |
| 8         | 10/20/2014 | 0.49   | Pearl St                | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union St         | Rear End                                                      |
| 8         | 12/4/2014  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | unknown                               | N Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 1/16/2015  | 0.49   | Pearl St                | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | S Union St         | Opp Direction Sideswipe                                       |
| 8         | 2/19/2015  | 0.49   | Pearl St                | Snow              | Property Damage Only | All-way Flasher (Red on Cross Street) | N Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 3/26/2015  | 0.49   | Pearl St                | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union            | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 4/9/2015   | 0.49   | Pearl St                | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | S Union St         | Rear End                                                      |
| 8         | 4/10/2015  | 0.49   | Pearl St                | Dry               | Property Damage Only | No Control                            | S Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 4/27/2015  | 0.49   | Pearl St                | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | S Union St         | Rear End                                                      |
| 8         | 4/27/2015  | 0.49   | FAU-5038 Pearl St       | Wet               | Property Damage Only | Traffic Signal (Flashing)             | N Union St         | Rear End                                                      |
| 8         | 5/16/2015  | 0.49   | Pearl St                | Wet               | Property Damage Only | Traffic Signal (Normal Operation)     | N Union St         | Rear End                                                      |
| 8         | 8/10/2015  | 0.49   | Pearl St                | Dry               | Property Damage Only | No Control                            | South Union St     | Unknown                                                       |
| 8         | 9/1/2015   | 0.49   | Pearl St                | Dry               | Property Damage Only | No Control                            | N Union St         | Same Direction Sideswipe                                      |
| 8         | 9/3/2015   | 0.49   | Pearl St                | Dry               | Property Damage Only | All-way Flasher (Red on Cross Street) | S Union St         | No Turns, Thru moves only, Broadside ^<                       |
| 8         | 9/15/2015  | 0.49   | FAU-5038 Pearl St       | Dry               | Property Damage Only | No Control                            | N Union St         | Same Direction Sideswipe                                      |
| 8         | 10/5/2013  | 0.5    | FAU-5038 (240 Pearl St) | Dry               | Injury               | No Control                            | So Union St        | Left Turn and Thru, Angle Broadside -->v--                    |
| 8         | 10/21/2013 | 0.5    | FAU-5038 Pearl st       | Dry               | Property Damage Only | No Control                            | N Union St         | Same Direction Sideswipe                                      |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                 | Surface Condition         | Crash Type           | Traffic Signals                   | Intersection With    | Dir. of Collision                                              |
|-----------|------------|--------|--------------------------------|---------------------------|----------------------|-----------------------------------|----------------------|----------------------------------------------------------------|
| 8         | 10/31/2013 | 0.5    | FAU-5038 Pearl St              | Wet                       | Property Damage Only | Traffic Signal (Normal Operation) | N Union St           | Rear End                                                       |
| 8         | 11/5/2013  | 0.5    | FAU-5038 (240 Pearl St)        | Dry                       | Property Damage Only | Traffic Signal (Normal Operation) | So Union St          | Rear End                                                       |
| 8         | 11/9/2013  | 0.5    | FAU-5038 (240 Pearl St)        | Dry                       | Property Damage Only | Traffic Signal (Flashing)         | S Union St           | No Turns, Thru moves only, Broadside ^<                        |
| 8         | 11/29/2013 | 0.5    | FAU-5038 Pearl St              | Dry                       | Property Damage Only | Traffic Signal (Normal Operation) | N Union St           | No Turns, Thru moves only, Broadside ^<                        |
| 8         | 12/27/2013 | 0.5    | FAU-5038 Pearl St              | Slush                     | Property Damage Only | Traffic Signal (Normal Operation) | S Union St           | No Turns, Thru moves only, Broadside ^<                        |
| 8         | 2/13/2014  | 0.5    | FAU-5038 Pearl St              | Snow                      | Property Damage Only | Traffic Signal (Normal Operation) | N Union St           | Left Turn and Thru, Same Direction Sideswipe/Angle Crash v--   |
| 8         | 3/9/2014   | 0.5    | FAU-5038 Pearl St              | Wet                       | Property Damage Only | Traffic Signal (Normal Operation) | N Union              | No Turns, Thru moves only, Broadside ^<                        |
| 8         | 3/22/2014  | 0.5    | FAU-5038 Pearl St              | Dry                       | Property Damage Only | No Control                        | S Union St           | Head On                                                        |
| 8         | 12/29/2013 | 0.51   | FAU-5038 (239 Pearl St)        | Wet                       | Property Damage Only | No Control                        | South Union St       | Rear End                                                       |
| 8         | 1/10/2014  | 0.51   | FAU-5038 Pearl St              | Wet                       | Property Damage Only | No Control                        | N Union St           | Same Direction Sideswipe                                       |
| 8         | 5/20/2014  | 0.51   | FAU-5038 Pearl St              | Dry                       | Property Damage Only | No Control                        | N Union St           | No Turns, Thru moves only, Broadside ^<                        |
| 9         | 9/9/2011   | 0.67   | FAU 5038 (322 Pearl Street)    | Dry                       | Injury               | Traffic Signal                    | South Willard Street | Single Vehicle Crash                                           |
| 9         | 3/23/2012  | 0.67   | FAU-5038 Pearl St              | Dry                       | Injury               | No Control                        | N Willard St         | Rear End                                                       |
| 9         | 2/11/2013  | 0.67   | FAU-5038 Pearl Street          | Slush                     | Injury               | Traffic Signal (Flashing)         | North Willard Street | Rear End                                                       |
| 9         | 9/6/2013   | 0.67   | FAU-5038 Pearl St              | Dry                       | Property Damage Only | Traffic Signal                    | S Willard            | Rear End                                                       |
| 9         | 10/21/2013 | 0.67   | FAU-5038 Pearl St              | Dry                       | Injury               | No Control                        | N Willard St         | Unknown                                                        |
| 9         | 2/21/2014  | 0.67   | FAU-5038 Pearl St              | Wet                       | Property Damage Only | No Control                        | N Willard St         | Unknown                                                        |
| 9         | 8/10/2015  | 0.67   | Pearl St                       | Dry                       | Injury               | Traffic Signal                    | N Willard St         | Unknown                                                        |
| 9         | 10/6/2015  | 0.67   | FAU-5038 Pearl St              | Dry                       | Property Damage Only | Traffic Signal                    | S Willard St         | Rear End                                                       |
| 9         | 11/26/2012 | 0.68   | FAU-5038 Pearl St              | Snow                      | Property Damage Only | Traffic Signal                    | S Willard St         | Rear End                                                       |
| 9         | 11/23/2013 | 0.68   | FAU-5038 Pearl St              | Ice                       | Property Damage Only | Traffic Signal                    | N Willard St         | Rear End                                                       |
| 9         | 11/23/2013 | 0.68   | FAU-5038 Pearl St              | Ice                       | Property Damage Only | No Control                        | N Willard St         | Rear End                                                       |
| 9         | 1/24/2014  | 0.68   | FAU-5038 Pearl St              | Snow                      | Property Damage Only | No Control                        | S Willard St         | Same Direction Sideswipe                                       |
| 9         | 4/2/2015   | 0.68   | FAU-5038 Pearl St              | Dry                       | Injury               | Traffic Signal                    | S Willard St         | Left Turn and Thru, Angle Broadside -->v--                     |
| 9         | 7/1/2011   | 0.69   | FAU 5038 (Pearl St)            | Dry                       | Property Damage Only | Traffic Signal                    | S Willard St         | Rear End                                                       |
| 9         | 7/17/2011  | 0.69   | FAU 5038 (Pearl St)            | Dry                       | Injury               | Traffic Signal                    | N Willard St         | No Turns, Thru moves only, Broadside ^<                        |
| 9         | 8/29/2011  | 0.69   | FAU 5038 (Pearl Street)        | Dry                       | Property Damage Only | Traffic Signal                    | S Willard St         | Rear End                                                       |
| 9         | 10/31/2011 | 0.69   | FAU 5038 (Pearl Street)        | Dry                       | Property Damage Only | Traffic Signal                    | S Willard St         | Left Turn and Thru, Angle Broadside -->v--                     |
| 9         | 12/16/2011 | 0.69   | FAU-5038 Pearl St              | Dry                       | Injury               | Traffic Signal                    | N Willard St         | Head On                                                        |
| 9         | 2/24/2012  | 0.69   | FAU 5038 (Pearl Street)        | Snow                      | Property Damage Only | No Control                        | N Willard St         | Unknown                                                        |
| 9         | 3/22/2012  | 0.69   | FAU-5038 Pearl St              | Dry                       | Injury               | Traffic Signal                    | S Willard St         | Rear End                                                       |
| 9         | 6/20/2012  | 0.69   | FAU-5038 Pearl St              | Dry                       | Property Damage Only | Traffic Signal                    | N Willard St         | Rear End                                                       |
| 9         | 9/4/2012   | 0.69   | FAU-5038 Pearl St              | water (standing / moving) | Property Damage Only | Traffic Signal                    | Willard St           | Left Turn and Thru, Broadside v<--                             |
| 9         | 3/19/2013  | 0.69   | FAU-5038 Pearl Street          | Slush                     | Property Damage Only | Traffic Signal                    | North Willard Street | Rear End                                                       |
| 9         | 5/7/2013   | 0.69   | FAU-5038 Pearl St/S Willard St | Dry                       | Property Damage Only | No Control                        | S Willard St         | Rear End                                                       |
| 9         | 6/13/2013  | 0.69   | FAU-5038 Pearl St              | Dry                       | Injury               | Traffic Signal                    | N Willard St         | Right Turn and Thru, Broadside ^<--                            |
| 9         | 7/23/2013  | 0.69   | FAU-5038 Pearl St              | Wet                       | Property Damage Only | No Control                        | S Willard St         | Rear End                                                       |
| 9         | 4/8/2014   | 0.69   | FAU-5038 Pearl St              | Dry                       | Property Damage Only | Traffic Signal                    | S Willard St         | Rear End                                                       |
| 9         | 7/11/2014  | 0.69   | Pearl St                       | Dry                       | Property Damage Only | Traffic Signal                    | N Willard St         | Rear End                                                       |
| 9         | 1/13/2015  | 0.69   | FAU-5038(328 Pearl St)         | Wet                       | Property Damage Only | Traffic Signal (Flashing)         | S Willard St         | No Turns, Thru moves only, Broadside ^<                        |
| 9         | 12/19/2015 | 0.69   | FAU-5038 Pearl St              | Dry                       | Property Damage Only | Traffic Signal                    | So Willard St        | No Turns, Thru moves only, Broadside ^<                        |
| 9         | 12/7/2011  | 0.7    | FAU 5038 (338 Pearl St)        | Wet                       | Property Damage Only | No Control                        | Willard St           | Same Direction Sideswipe                                       |
| 9         | 8/14/2012  | 0.7    | FAU-5038 Pearl St              | Dry                       | Property Damage Only | No Control                        | N Willard St         | Rear End                                                       |
| 9         | 8/16/2012  | 0.71   | FAU-5038 (337 Pearl St)        | Dry                       | Property Damage Only | No Control                        | N Willard St         | No Turns, Thru moves only, Broadside ^<                        |
| 9         | 12/26/2014 | 2.4    | US-7(17 S Willard St)          | Snow                      | Property Damage Only | No Control                        | Pearl St             | Unknown                                                        |
| 9         | 10/3/2014  | 2.41   | 3 S Willard St                 | Dry                       | Property Damage Only | No Control                        | Pearl St             | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 9         | 1/4/2011   | 2.43   | US-7 (Pearl Street)            | Wet                       | Injury               | Traffic Signal                    | S Willard Street     | No Turns, Thru moves only, Broadside ^<                        |

Report results from the online Public Query Tool may not match exactly with those obtained directly from VTrans Crash staff due to the nuances of reporting mechanisms.

FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                         | Surface Condition | Crash Type           | Traffic Signals                       | Intersection With     | Dir. of Collision                                             |
|-----------|------------|--------|----------------------------------------|-------------------|----------------------|---------------------------------------|-----------------------|---------------------------------------------------------------|
| 9         | 2/6/2011   | 2.43   | US-7 (Willard Street)                  | Snow              | Property Damage Only | Traffic Signal                        | Pearl Street          | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^- |
| 9         | 4/26/2011  | 2.43   | US-7 South Willard Street              | Wet               | Property Damage Only | Traffic Signal                        | Pearl Street          | Rear End                                                      |
| 9         | 6/21/2011  | 2.43   | US-7 S Willard St                      | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 9/9/2011   | 2.43   | US-7 (S Willard Street)                | Dry               | Injury               | Traffic Signal                        | Pearl St              | Right Turn and Thru, Broadside ^<--                           |
| 9         | 9/18/2011  | 2.43   | US-7 S Willard St                      | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 11/12/2011 | 2.43   | US-7 (S Willard Street)                | Dry               | Property Damage Only | No Control                            | Pearl St              | Unknown                                                       |
| 9         | 7/18/2012  | 2.43   | US-7 N Willard St                      | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                                      |
| 9         | 7/27/2012  | 2.43   | US-7 S Willard St                      | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                                      |
| 9         | 10/16/2012 | 2.43   | US-7 Willard Street                    | Dry               | Property Damage Only | Traffic Signal                        | Pearl Street          | Left Turn and Thru, Angle Broadside -->v--                    |
| 9         | 10/23/2012 | 2.43   | US-7 North Willard Street/Pearl Street | Dry               | Property Damage Only | Traffic Signal (Flashing)             | North Willard Street  | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 11/26/2012 | 2.43   | US-7 S Willard St                      | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                                      |
| 9         | 11/28/2012 | 2.43   | US-7 Willard Street/Pearl Street       | Dry               | Property Damage Only | All-way Flasher (Red on Cross Street) | Willard Street        | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 12/20/2012 | 2.43   | US-7 North Willard Street              | Wet               | Property Damage Only | Traffic Signal                        | Pearl Street          | Left Turn and Thru, Angle Broadside -->v--                    |
| 9         | 3/15/2013  | 2.43   | US-7 South Willard Street              | Dry               | Property Damage Only | No Control                            | Pearl Street          | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^- |
| 9         | 4/6/2013   | 2.43   | US-7 North Willard Street              | Dry               | Property Damage Only | Traffic Signal (Flashing)             | Pearl Street          | Unknown                                                       |
| 9         | 5/29/2013  | 2.43   | US-7 N. Willard St./Pearl St           | Wet               | Property Damage Only | Traffic Signal                        | N Willard St          | Rear End                                                      |
| 9         | 9/15/2013  | 2.43   | US-7 S. Willard St./Pearl St           | Dry               | Injury               | Traffic Signal                        | S Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 9/19/2013  | 2.43   | US-7 N. Willard St./Pearl St           | Dry               | Property Damage Only | No Control                            | N Willard St          | Left Turn and Thru, Angle Broadside -->v--                    |
| 9         | 10/27/2013 | 2.43   | US-7 N. Willard St./Pearl St           | Dry               | Property Damage Only | Traffic Signal                        | N Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 11/6/2013  | 2.43   | US-7 N Willard St/Pearl St             |                   | Property Damage Only | unknown                               | N Willard St          | unknown                                                       |
| 9         | 3/1/2014   | 2.43   | US-7 S. Willard St./Pearl St           | Dry               | Injury               | Traffic Signal                        | S Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 5/27/2014  | 2.43   | US-7 N Willard St                      | Dry               | Property Damage Only | No Control                            | Pearl St              | Same Direction Sideswipe                                      |
| 9         | 7/31/2014  | 2.43   | US-7 N. Willard St./Pearl St           | Wet               | Property Damage Only | Traffic Signal                        | N Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 11/20/2014 | 2.43   | US-7 S. Willard St./Pearl St           | Dry               | Property Damage Only | Traffic Signal                        | S Willard St          | Rear End                                                      |
| 9         | 12/7/2014  | 2.43   | US-7 S. Willard St./Pearl St           | Dry               | Injury               | Traffic Signal (Flashing)             | S Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 12/23/2014 | 2.43   | US-7 S. Willard St./Pearl St           | Snow              | Injury               | All-way Flasher (Red on Cross Street) | S Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 2/21/2015  | 2.43   | Pearl St                               | Snow              | Property Damage Only | No Control                            | N Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 2/27/2015  | 2.43   | US-7 S. Willard St./Pearl St           | Dry               | Property Damage Only | Traffic Signal (Flashing)             | S Willard St          | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 3/26/2015  | 2.43   | US-7 S. Willard St./Pearl St           | Wet               | Property Damage Only | Traffic Signal                        | S Willard St          | Left Turn and Thru, Angle Broadside -->v--                    |
| 9         | 4/22/2015  | 2.43   | N Willard St                           | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                                      |
| 9         | 4/22/2015  | 2.43   | Pearl St                               | Wet               | Property Damage Only | Traffic Signal                        | S Willard St          | Left Turn and Thru, Angle Broadside -->v--                    |
| 9         | 9/1/2015   | 2.43   | US-7 N Willard St./Pearl St            | Dry               | Injury               | Traffic Signal                        | N Willard St          | Unknown                                                       |
| 9         | 9/17/2015  | 2.43   | US-7 S Willard ST                      | Dry               | Property Damage Only | Traffic Signal                        | Pearl ST              | Rear End                                                      |
| 9         | 11/23/2015 | 2.43   | N Willard St                           | Dry               | Property Damage Only | Traffic Signal                        | Pearl St              | Left Turn and Thru, Angle Broadside -->v--                    |
| 9         | 12/19/2015 | 2.43   | US-7 N. Willard St./Pearl St           | Dry               | Property Damage Only | Traffic Signal                        | N Willard St          | Head On                                                       |
| 9         | 10/9/2012  | 2.44   | US-7 N Willard St                      | Wet               | Property Damage Only | No Control                            | Pearl St              | No Turns, Thru moves only, Broadside ^<                       |
| 9         | 6/30/2011  | 2.46   | US-7 (17 No Willard St)                | Dry               | Property Damage Only | No Control                            | 17 No Willard St      | Opp Direction Sideswipe                                       |
| 10        | 2/1/2011   | 0      | FAU 5014 (Colchester Ave)              | Snow              | Property Damage Only | No Control                            | Prospect Ave          | Rear End                                                      |
| 10        | 3/18/2011  | 0      | FAU-5014 Colchester Ave.               | Wet               | Property Damage Only | No Control                            | South Prospect St.    | No Turns, Thru moves only, Broadside ^<                       |
| 10        | 11/14/2011 | 0      | FAU-5014 Colchester Ave                | Dry               | Injury               | No Control                            | East Ave              | Rear End                                                      |
| 10        | 9/7/2012   | 0      | FAU-5014 Colchester Ave                | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | No Prospect St        | Unknown                                                       |
| 10        | 10/17/2012 | 0      | FAU-5014 Colchester Ave                | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | S Prospect St         | Right Turn and Thru, Broadside ^<--                           |
| 10        | 10/25/2012 | 0      | FAU-5014 Colchester Avenue             | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | South Prospect Street | Left Turn and Thru, Angle Broadside -->v--                    |
| 10        | 3/12/2013  | 0      | FAU-5014 Colchester Ave                | Wet               | Injury               | Traffic Signal (Normal Operation)     | S Prospect St         | Left Turn and Thru, Angle Broadside -->v--                    |
| 10        | 10/2/2013  | 0      | FAU-5014 Colchester Ave                | Dry               | Property Damage Only | Traffic Signal (Normal Operation)     | N Prospect St         | Right Turn and Thru, Angle Broadside -->^--                   |
| 10        | 11/12/2013 | 0      | FAU-5014 Colchester Av./ Pearl St      | Dry               | Property Damage Only | No Control                            | S Prospect St         | Rear End                                                      |
| 10        | 11/21/2013 | 0      | FAU-5014 Colchester Ave                | Dry               | Injury               | Traffic Signal (Normal Operation)     | S Prospect St         | Rear End                                                      |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                 | Surface Condition | Crash Type           | Traffic Signals                   | Intersection With     | Dir. of Collision                                   |
|-----------|------------|--------|--------------------------------|-------------------|----------------------|-----------------------------------|-----------------------|-----------------------------------------------------|
| 10        | 12/2/2013  | 0      | FAU-5014 Colchester Ave        | Wet               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Rear End                                            |
| 10        | 5/27/2014  | 0      | Colchester Ave                 | Dry               | Property Damage Only | No Control                        | N Prospect St         | Rear End                                            |
| 10        | 9/2/2014   | 0      | FAU-5014 Colchester Ave        | Wet               | Injury               | Traffic Signal (Normal Operation) | S Prospect St         | Head On                                             |
| 10        | 10/26/2015 | 0      | Colchester Ave                 | Dry               | Property Damage Only | unknown                           | S Prospect St         | Rear End                                            |
| 10        | 10/27/2015 | 0      | Colchester Ave                 | Unknown           | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | No Turns, Thru moves only, Broadside ^<             |
| 10        | 11/17/2015 | 0      | Colchester Ave                 | Dry               | Property Damage Only | No Control                        | N Prospect St         | Same Direction Sideswipe                            |
| 10        | 12/8/2015  | 0      | FAU-5014 Colchester Ave        | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Rear End                                            |
| 10        | 5/14/2013  | 0.01   | FAU-5014 (2 Colchester Ave)    | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 2/25/2011  | 0.27   | FAU 5050 (1 Prospect Street)   | Snow              | Property Damage Only | Traffic Signal (Normal Operation) | Colchester Ave        | Rear End                                            |
| 10        | 2/1/2011   | 0.3    | FAU 5050 (1 S Prospect Street) | Snow              | Property Damage Only | No Control                        |                       | Rear End                                            |
| 10        | 9/9/2011   | 0.3    | FAU 5050 (S Prospect Street)   | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | Pearl St              | Unknown                                             |
| 10        | 11/11/2011 | 0.3    | FAU 5050 (So Prospect St)      | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | Colchester Ave        | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 11/18/2011 | 0.3    | FAU 5050 (S Prospect St)       | Dry               | Property Damage Only | No Control                        | Pearl St              | Rear End                                            |
| 10        | 11/23/2011 | 0.3    | FAU 5050 (S Prospect Street)   | Snow              | Property Damage Only | Traffic Signal (Normal Operation) | Colchester Ave        | Same Direction Sideswipe                            |
| 10        | 12/1/2011  | 0.3    | 1 South Prospect St            | Dry               | Property Damage Only | No Control                        | Pearl St              | Same Direction Sideswipe                            |
| 10        | 1/7/2012   | 0.3    | FAU 5050 (S Prospect Street)   | Slush             | Injury               | Traffic Signal (Normal Operation) | Pearl St              | Rear End                                            |
| 10        | 2/1/2012   | 0.3    | FAU 5050 (S Prospect Street)   | Wet               | Injury               | Traffic Signal (Normal Operation) | Pearl St              | Single Vehicle Crash                                |
| 10        | 12/30/2012 | 0.3    | FAU-5050 South Prospect Street | Slush             | Property Damage Only | Traffic Signal (Normal Operation) | Pearl Street          | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 5/1/2013   | 0.3    | FAU-5050 South Prospect Street | Dry               | Injury               | Traffic Signal (Normal Operation) | Colchester Avenue     | Rear End                                            |
| 10        | 7/17/2013  | 0.3    | FAU-5050 S Prospect St         | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | Colchester Ave        | Opp Direction Sideswipe                             |
| 10        | 1/24/2012  | 0.91   | FAU 5038 (Pearl Street)        | Dry               | Injury               | unknown                           | N Prospect St         | Rear End                                            |
| 10        | 7/11/2011  | 0.929  | FAU 5038 (Pearl Street)        | Dry               | Property Damage Only | No Control                        | N Prospect St         | Same Direction Sideswipe                            |
| 10        | 1/20/2012  | 0.93   | FAU 5038 (Pearl Street)        | Unknown           | Property Damage Only | No Control                        | No Prospect St        | Rear End                                            |
| 10        | 6/29/2012  | 0.93   | FAU-5038 Pearl Street          | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | North Prospect Street | Rear End                                            |
| 10        | 6/4/2013   | 0.93   | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | N Union               | Rear End                                            |
| 10        | 11/23/2013 | 0.93   | FAU-5038 Pearl St              | Ice               | Property Damage Only | unknown                           | N Prospect St         | Right Turn and Thru, Head On v^--                   |
| 10        | 10/16/2014 | 0.93   | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Same Direction Sideswipe                            |
| 10        | 1/23/2015  | 0.93   | Pearl St                       | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Single Vehicle Crash                                |
| 10        | 5/7/2015   | 0.93   | Pearl St                       | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Opp Direction Sideswipe                             |
| 10        | 10/16/2015 | 0.93   | Colchester Ave                 | Wet               | Property Damage Only | Traffic Signal (Normal Operation) | N Prospect St         | Same Direction Sideswipe                            |
| 10        | 11/7/2015  | 0.93   | Pearl St                       | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | N Prospect St         | Rear End                                            |
| 10        | 11/20/2015 | 0.93   | FAU-5038 Pearl St              | Dry               | Injury               | No Control                        | N Prospect St         | Rear End                                            |
| 10        | 1/12/2011  | 0.94   | FAU 5038 (Pearl Street)        | Unknown           | Property Damage Only | No Control                        | North Prospect        | Same Direction Sideswipe                            |
| 10        | 1/17/2011  | 0.94   | FAU 5038 (Pearl Street)        | Wet               | Property Damage Only | Traffic Signal (Normal Operation) | Prospect Street       | Left and Right Turns, Simultaneous Turn Crash --v-- |
| 10        | 4/17/2012  | 0.94   | FAU-5038 Pearl St              | Dry               | Property Damage Only | No Control                        | S Prospect St         | Rear End                                            |
| 10        | 9/4/2012   | 0.94   | FAU-5038 Pearl St              | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 10/26/2012 | 0.94   | FAU-5038 Pearl St              | Dry               | Injury               | No Control                        | N Willard St          | Rear End                                            |
| 10        | 12/18/2012 | 0.94   | FAU-5038 Pearl Street          | Wet               | Property Damage Only | Traffic Signal (Normal Operation) | South Prospect Street | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 5/24/2013  | 0.94   | FAU-5038 Pearl St              | Wet               | Property Damage Only | Traffic Signal (Normal Operation) | S Prospect St         | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 6/9/2015   | 0.94   | Pearl St                       | Wet               | Injury               | Traffic Signal (Normal Operation) | S Prospect St         | Left Turn and Thru, Angle Broadside -->v--          |
| 10        | 11/1/2015  | 0.94   | Pearl St                       | Dry               | Property Damage Only | Traffic Signal (Normal Operation) | s Prospect St         | Head On                                             |
| 13        | 7/15/2014  | 0.15   | FAU-5022 Main St               | Dry               | Property Damage Only | No Control                        | 85 Pine St            | Rear End                                            |
| 13        | 3/3/2015   | 0.15   | FAU-5022(85 Main St)           | Wet               | Property Damage Only | No Control                        | Pine St               | Same Direction Sideswipe                            |
| 13        | 1/2/2011   | 0.17   | FAU Main Street                | Slush             | Property Damage Only | Traffic Signal                    | Pine St               | Left Turn and Thru, Angle Broadside -->v--          |
| 13        | 3/9/2011   | 0.17   | FAU 5022 (Main Street)         | Wet               | Property Damage Only | Traffic Signal                    | Pine St               | Opp Direction Sideswipe                             |
| 13        | 10/20/2011 | 0.17   | FAU 5022 (Main Street)         | Dry               | Property Damage Only | Traffic Signal                    | Pine St               | Opp Direction Sideswipe                             |
| 13        | 2/3/2012   | 0.17   | FAU 5022 (Main Street)         | Dry               | Injury               | Traffic Signal                    | Pine St               | Rear End                                            |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address             | Surface Condition         | Crash Type           | Traffic Signals | Intersection With | Dir. of Collision                                   |
|-----------|------------|--------|----------------------------|---------------------------|----------------------|-----------------|-------------------|-----------------------------------------------------|
| 13        | 3/19/2012  | 0.17   | FAU 5022 (Main Street)     | Dry                       | Property Damage Only | Traffic Signal  | Pine St           | Rear End                                            |
| 13        | 7/14/2012  | 0.17   | FAU-5022 Main St           | Dry                       | Property Damage Only | unknown         | Pine St           | Left Turn and Thru, Angle Broadside -->v--          |
| 13        | 8/9/2012   | 0.17   | FAU-5022 Main St           | Wet                       | Injury               | Traffic Signal  | Pine St           | Same Direction Sideswipe                            |
| 13        | 1/3/2013   | 0.17   | Main Street                | Wet                       | Injury               | Traffic Signal  | Pine St           | No Turns, Thru moves only, Broadside ^<             |
| 13        | 4/3/2013   | 0.17   | FAU-5022 Main Street       | Dry                       | Property Damage Only | Traffic Signal  | Pine St           | No Turns, Thru moves only, Broadside ^<             |
| 13        | 11/3/2013  | 0.17   | FAU-5022 Main St           |                           | Property Damage Only | unknown         | Pine St           | Unknown                                             |
| 13        | 7/9/2014   | 0.17   | Main St                    | Dry                       | Property Damage Only | Traffic Signal  | Pine St           | Unknown                                             |
| 13        | 10/11/2014 | 0.17   | Main St                    | Dry                       | Property Damage Only | No Control      | Pine St           | Same Direction Sideswipe                            |
| 13        | 12/3/2014  | 0.17   | Main St                    | Dry                       | Property Damage Only | Traffic Signal  | Pine St           | Rear End                                            |
| 13        | 12/13/2014 | 0.17   | Main St                    | water (standing / moving) | Property Damage Only | No Control      | Pine St           | Same Direction Sideswipe                            |
| 13        | 12/23/2014 | 0.17   | FAU-5022 Main St           | Wet                       | Injury               | Traffic Signal  | St Paul St        | Single Vehicle Crash                                |
| 13        | 2/21/2015  | 0.17   | FAU-5022 Main St           | Snow                      | Property Damage Only | Traffic Signal  | Pine St           | Rear End                                            |
| 13        | 2/27/2015  | 0.17   | Main St                    | Dry                       | Property Damage Only | Traffic Signal  | Pine St           | Rear End                                            |
| 13        | 8/14/2015  | 0.17   | Main St                    | Dry                       | Property Damage Only | No Control      | Pine St           | Unknown                                             |
| 13        | 12/9/2015  | 0.17   | FAU-5022 Main St           | Dry                       | Property Damage Only | unknown         | Pine St           | Rear End                                            |
| 13        | 11/18/2015 | 0.18   | FAU-5022 Main St           | Dry                       | Property Damage Only | No Control      | Pine St           | Head On                                             |
| 13        | 5/2/2012   | 1.41   | FAU-5040 Pine St           | Dry                       | Property Damage Only | Traffic Signal  | Main St           | Same Direction Sideswipe                            |
| 13        | 5/2/2013   | 1.41   | FAU-5040 Pine St           | Dry                       | Property Damage Only | No Control      | Main St           | Rear End                                            |
| 13        | 6/22/2014  | 1.41   | FAU-5040 Pine St           | Dry                       | Property Damage Only | Traffic Signal  | Main St           | Same Direction Sideswipe                            |
| 13        | 8/27/2014  | 1.41   | Pine St                    | Dry                       | Property Damage Only | Traffic Signal  | Main St           | Unknown                                             |
| 13        | 10/14/2014 | 1.41   | FAU-5040 Pine St./Main St  | Dry                       | Property Damage Only | No Control      | Pine St           | No Turns, Thru moves only, Broadside ^<             |
| 13        | 12/3/2014  | 1.41   | FAU-5040 Pine St           | Dry                       | Property Damage Only | No Control      | Main St           | Unknown                                             |
| 14        | 1/31/2011  | 0.22   | FAU 5022 (111 Main Street) | Dry                       | Property Damage Only | No Control      | St Paul St        | Same Direction Sideswipe                            |
| 14        | 5/25/2013  | 0.22   | FAU-5022 (111 Main St)     | Wet                       | Property Damage Only | Traffic Signal  | Main St           | Unknown                                             |
| 14        | 6/12/2015  | 0.24   | Main St                    | Dry                       | Property Damage Only | No Control      | St Paul St        | No Turns, Thru moves only, Broadside ^<             |
| 14        | 9/4/2011   | 0.25   | FAU 5022 (Main St)         | Dry                       | Property Damage Only | Traffic Signal  | St Paul St        | Left Turn and Thru, Broadside v<--                  |
| 14        | 12/3/2011  | 0.25   | FAU 5022 (Main Street)     | Dry                       | Injury               | Traffic Signal  | St Paul St        | Unknown                                             |
| 14        | 6/13/2012  | 0.25   | FAU-5022 Main St           | Dry                       | Property Damage Only | No Control      | St Paul St        | Unknown                                             |
| 14        | 7/9/2013   | 0.25   | FAU-5022 Main St           | Dry                       | Property Damage Only | No Control      | St Paul St        | Rear End                                            |
| 14        | 9/4/2013   | 0.25   | FAU-5022 Main St           | Dry                       | Property Damage Only | Traffic Signal  | St Paul St        | Same Direction Sideswipe                            |
| 14        | 10/1/2013  | 0.25   | FAU-5022 Main St           |                           | Injury               | unknown         | St Paul St        | Unknown                                             |
| 14        | 3/5/2014   | 0.25   | FAU-5022 Main St           | Dry                       | Injury               | Traffic Signal  | St Paul St        | Unknown                                             |
| 14        | 6/30/2014  | 0.25   | FAU-5022 Main St           | Dry                       | Property Damage Only | Traffic Signal  | St Paul St        | Rear End                                            |
| 14        | 10/1/2014  | 0.25   | FAU-5022 Main St           | Dry                       | Property Damage Only | Traffic Signal  | St Paul St        | Rear End                                            |
| 14        | 10/17/2014 | 0.25   | Main St                    | Dry                       | Property Damage Only | Traffic Signal  | St Paul St        | Same Direction Sideswipe                            |
| 14        | 12/26/2014 | 0.25   | Main St                    | Dry                       | Property Damage Only | Traffic Signal  | S Winooski Ave    | Rear End                                            |
| 14        | 1/10/2015  | 0.25   | FAU 5022 Main St           | Dry                       | Property Damage Only | No Control      | St Paul St        | Rear End                                            |
| 14        | 4/27/2015  | 0.25   | Main St                    | Wet                       | Property Damage Only | No Control      | St Paul St        | Rear End                                            |
| 14        | 6/12/2015  | 0.25   | FAU-5022 Main St           | Wet                       | Property Damage Only | Traffic Signal  | St Paul St        | Unknown                                             |
| 14        | 9/10/2015  | 0.25   | FAU-5022 Main St           | Dry                       | Property Damage Only | No Control      | St Paul St        | Same Direction Sideswipe                            |
| 14        | 11/3/2015  | 0.25   | Main St                    | Dry                       | Property Damage Only | No Control      | St Paul St        | Unknown                                             |
| 14        | 3/3/2012   | 0.26   | FAU 5022 (Main Street)     | Dry                       | Property Damage Only | No Control      | St Paul St        | Rear End                                            |
| 14        | 6/8/2012   | 0.26   | FAU-5022 Main Street       | Dry                       | Property Damage Only | Traffic Signal  | St. Paul Street   | Left and Right Turns, Simultaneous Turn Crash --v-- |
| 14        | 11/7/2012  | 0.26   | FAU-5022 Main St           | Dry                       | Property Damage Only | Traffic Signal  | St Paul St        | Same Direction Sideswipe                            |
| 14        | 12/13/2012 | 0.26   | FAU-5022 Main Street       | Dry                       | Property Damage Only | Traffic Signal  | Pine Street       | Same Direction Sideswipe                            |
| 14        | 12/2/2013  | 0.26   | FAU-5022 Main St           |                           | Property Damage Only | unknown         | St Paul St        | Unknown                                             |
| 14        | 3/18/2014  | 0.26   | FAU-5022 Main St           | Dry                       | Property Damage Only | No Control      | St Paul St        | Rear End                                            |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                 | Surface Condition | Crash Type           | Traffic Signals                       | Intersection With     | Dir. of Collision                                    |
|-----------|------------|--------|--------------------------------|-------------------|----------------------|---------------------------------------|-----------------------|------------------------------------------------------|
| 14        | 5/10/2014  | 0.26   | FAU-5022 Main St               | Wet               | Property Damage Only | unknown                               | St Paul St            | Unknown                                              |
| 14        | 6/7/2014   | 0.26   | FAU-5022 Main St               | Dry               | Property Damage Only | No Control                            | St Paul St            | Left Turn and Thru, Broadside v<--                   |
| 14        | 2/16/2013  | 0.27   | FAU-5022 Main St               | Dry               | Property Damage Only | No Control                            | St Paul St            | Same Direction Sideswipe                             |
| 14        | 8/8/2014   | 0.28   | FAU-5022 Main St               | Dry               | Property Damage Only | No Control                            | Church St             | Rear End                                             |
| 14        | 7/27/2011  | 0.57   | FAU-5048 (152 St Paul St)      | Dry               | Property Damage Only | Traffic Signal                        | King St               | Unknown                                              |
| 14        | 3/11/2011  | 0.58   | FAU 5046 (150 ST. PAUL STREET) |                   | Property Damage Only | unknown                               |                       | Unknown                                              |
| 14        | 12/3/2012  | 0.58   | FAU-5046 (150 St Paul Street)  | Unknown           | Property Damage Only | No Control                            | N/A                   | No Turns, Thru moves only, Broadside ^<              |
| 14        | 4/9/2011   | 0.59   | FAU-5046 St. Paul/Main St.     | Dry               | Property Damage Only | Traffic Signal                        | St. Paul/Main St.     | Rear End                                             |
| 14        | 8/25/2011  | 0.6    | FAU 5046 (St Paul Street)      | Wet               | Property Damage Only | Traffic Signal                        | Pearl St              | Rear End                                             |
| 14        | 9/15/2011  | 0.6    | FAU 5046 (St Paul Street)      | Wet               | Injury               | Traffic Signal                        | Main St               | Rear End                                             |
| 14        | 1/16/2012  | 0.6    | FAU 5046 (St Paul Street)      | Dry               | Injury               | Traffic Signal                        | Main St               | Unknown                                              |
| 14        | 6/18/2012  | 0.6    | FAU-5046 St Paul Street        | Dry               | Property Damage Only | No Control                            | Main Street           | Unknown                                              |
| 14        | 6/23/2012  | 0.6    | FAU-5046 St Paul St            | Dry               | Injury               | Traffic Signal                        | Main St               | Unknown                                              |
| 14        | 10/14/2012 | 0.6    | FAU-5046 St Paul St            | Wet               | Property Damage Only | Traffic Signal                        | Main St               | Same Direction Sideswipe                             |
| 14        | 12/7/2012  | 0.6    | FAU-5046 (125 St Paul Street)  | Dry               | Property Damage Only | No Control                            | N/A                   | Rear-to-rear                                         |
| 14        | 8/7/2015   | 0.6    | FAU-5046 St Paul St            | Unknown           | Property Damage Only | All-way Flasher (Red on Cross Street) | Main St               | Same Direction Sideswipe                             |
| 15        | 2/12/2011  | 0.38   | FAU 5022 (#188 Main Street)    | Wet               | Property Damage Only | No Control                            |                       | Unknown                                              |
| 15        | 4/22/2011  | 0.38   | FAU-5022 (188 Main St)         | Dry               | Property Damage Only | No Control                            | Church St             | Same Direction Sideswipe                             |
| 15        | 7/12/2011  | 0.38   | FAU 5022 (188 Main St)         | Dry               | Property Damage Only | No Control                            | Nectars               | Left Turn and Thru, Angle Broadside -->v--           |
| 15        | 3/21/2012  | 0.38   | FAU 5022 (188 Main Street)     | Dry               | Injury               | No Control                            | So Winooski Ave       | Rear End                                             |
| 15        | 12/30/2012 | 0.38   | FAU-5022 (188 Main Street)     | Wet               | Property Damage Only | No Control                            | South Winooski Avenue | Rear End                                             |
| 15        | 2/18/2014  | 0.38   | FAU-5022 (188 Main St)         | Wet               | Property Damage Only | No Control                            | Nectar's Bar          | Same Direction Sideswipe                             |
| 15        | 2/18/2014  | 0.38   | 188 Main St                    | Wet               | Property Damage Only | Traffic Signal                        | S Winooski Ave        | Rear End                                             |
| 15        | 12/19/2014 | 0.38   | FAU-5022 (190 Main St)         | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | Same Direction Sideswipe                             |
| 15        | 1/24/2015  | 0.38   | FAU-5022 (188 Main St)         | Dry               | Property Damage Only | No Control                            | Church St             | Unknown                                              |
| 15        | 10/14/2015 | 0.38   | FAU-5022 (194 Main St)         | Dry               | Injury               | No Control                            | Esox                  | Right Turn and Thru, Broadside ^<--                  |
| 15        | 1/18/2011  | 0.39   | FAU 5022 (Main Street)         | Snow              | Property Damage Only | No Control                            | IFO E Sox Bar         | Left and Right Turns, Simultaneous Turn Crash --wv-- |
| 15        | 6/7/2011   | 0.39   | US-2 (200 Main Street)         | Dry               | Property Damage Only | No Control                            | South Winooski Avenue | Rear End                                             |
| 15        | 6/7/2011   | 0.39   | FAU-5022 (200 Main Street)     | Dry               | Property Damage Only | No Control                            | South Winooski Avenue | No Turns, Thru moves only, Broadside ^<              |
| 15        | 8/4/2011   | 0.39   | FAU-5022 (194 Main St)         | Dry               | Property Damage Only | No Control                            | 194 Main St           | Same Direction Sideswipe                             |
| 15        | 8/12/2011  | 0.39   | FAU 5022 (Main Street)         | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | Rear End                                             |
| 15        | 6/15/2012  | 0.39   | FAU-5022 (194 Main Street)     | Dry               | Property Damage Only | No Control                            | N/A                   | Rear End                                             |
| 15        | 9/19/2014  | 0.39   | FAU-5022 Main St               | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<              |
| 15        | 6/7/2011   | 0.4    | FAU-5022 (200 Main Street)     | Dry               | Property Damage Only | No Control                            | South Winooski Avenue | Rear End                                             |
| 15        | 7/25/2013  | 0.4    | FAU-5022 (202 Main St)         | Dry               | Injury               | No Control                            | Main St               | Rear End                                             |
| 15        | 9/25/2013  | 0.4    | FAU-5022 (199 Main St)         | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | Rear End                                             |
| 15        | 10/26/2013 | 0.4    | FAU-5022 (202 Main St)         |                   | Property Damage Only | unknown                               | Main Street           | Unknown                                              |
| 15        | 12/29/2013 | 0.4    | FAU-5022 Main St               | Wet               | Property Damage Only | No Control                            | S Winooski Ave        | Rear-to-rear                                         |
| 15        | 3/14/2014  | 0.4    | FAU-5022 (199 Main St)         | Snow              | Property Damage Only | No Control                            | 199 Main St           | Left Turn and Thru, Angle Broadside -->v--           |
| 15        | 1/31/2015  | 0.4    | Main St                        | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | Unknown                                              |
| 15        | 4/12/2015  | 0.4    | Main St                        | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | Rear End                                             |
| 15        | 9/3/2015   | 0.4    | Main St                        | Dry               | Property Damage Only | No Control                            | S Winooski Ave        | Unknown                                              |
| 15        | 11/18/2015 | 0.4    | Main St                        | Dry               | Property Damage Only | Traffic Signal                        | S Winooski Ave        | Head On                                              |
| 15        | 1/16/2011  | 0.41   | FAU 5022 (Main Street)         | Snow              | Property Damage Only | unknown                               | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<              |
| 15        | 4/1/2011   | 0.41   | FAU-5022 Main St               | Wet               | Injury               | unknown                               | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<              |
| 15        | 4/25/2011  | 0.41   | FAU-5022 (Main Street)         | Dry               | Injury               | Traffic Signal                        | South Winooski Avenue | No Turns, Thru moves only, Broadside ^<              |
| 15        | 6/17/2011  | 0.41   | FAU-5022 Main St               | Dry               | Property Damage Only | unknown                               | S Winooski Ave        | Unknown                                              |

Report results from the online Public Query Tool may not match exactly with those obtained directly from VTrans Crash staff due to the nuances of reporting mechanisms.

FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address             | Surface Condition | Crash Type           | Traffic Signals | Intersection With     | Dir. of Collision                           |
|-----------|------------|--------|----------------------------|-------------------|----------------------|-----------------|-----------------------|---------------------------------------------|
| 15        | 7/23/2011  | 0.41   | FAU 5022 (Main Street)     | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 9/2/2011   | 0.41   | FAU 5022 (Main Street)     | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Left Turn and Thru, Angle Broadside -->v--  |
| 15        | 10/9/2011  | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | So Winooski Ave       | Left Turn and Thru, Angle Broadside -->v--  |
| 15        | 10/16/2011 | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 11/3/2011  | 0.41   | FAU 5022 (Main Street)     | Wet               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Head On                                     |
| 15        | 1/27/2012  | 0.41   | FAU 5022 (Main Street)     | Wet               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 2/17/2012  | 0.41   | FAU 5022 (Main Street)     | Dry               | Property Damage Only | unknown         | S Winooski Ave        | Unknown                                     |
| 15        | 2/26/2012  | 0.41   | FAU 5022 (Main Street)     | Dry               | Property Damage Only | No Control      | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<     |
| 15        | 5/10/2012  | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 7/20/2012  | 0.41   | FAU-5022 Main St           |                   | Property Damage Only | Traffic Signal  | S Winooski Ave        | Unknown                                     |
| 15        | 8/20/2012  | 0.41   | FAU-5022 MAIN ST           | Dry               | Injury               | Traffic Signal  | S WINOOSKI AVE        | Rear End                                    |
| 15        | 8/20/2012  | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | Church St             | No Turns, Thru moves only, Broadside ^<     |
| 15        | 8/27/2012  | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 3/15/2013  | 0.41   | FAU-5022 Main Street       | Dry               | Property Damage Only | Traffic Signal  | South Winooski Avenue | Rear End                                    |
| 15        | 5/24/2013  | 0.41   | FAU-5022 Main St           | Wet               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Rear End                                    |
| 15        | 6/20/2013  | 0.41   | Main St                    | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 6/28/2013  | 0.41   | FAU-5022(199 Main Street)  | Wet               | Property Damage Only | No Control      | South Winooski Ave    | No Turns, Thru moves only, Broadside ^<     |
| 15        | 8/29/2013  | 0.41   | FAU-5022 (199 Main St)     | Dry               | Property Damage Only | No Control      | Church St             | Rear End                                    |
| 15        | 12/20/2013 | 0.41   | FAU-5022 Main St           | Snow              | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 4/9/2014   | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Single Vehicle Crash                        |
| 15        | 5/10/2014  | 0.41   | Main St                    | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 5/30/2014  | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 8/1/2014   | 0.41   | Main St                    | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 11/30/2014 | 0.41   | FAU-5022 Main St           | Wet               | Property Damage Only | No Control      | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 2/16/2015  | 0.41   | FAU-5022 Main St           | Slush             | Property Damage Only | No Control      | S Winooski Ave        | Rear-to-rear                                |
| 15        | 7/16/2015  | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Left Turn and Thru, Angle Broadside -->v--  |
| 15        | 8/21/2015  | 0.41   | Main St                    | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Rear End                                    |
| 15        | 9/5/2015   | 0.41   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 3/10/2011  | 0.42   | FAU 5022 (199 Main Street) | Dry               | Property Damage Only | unknown         |                       | Unknown                                     |
| 15        | 5/3/2012   | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 7/2/2012   | 0.42   | FAU-5022 (219 Main St)     | Dry               | Property Damage Only | No Control      | Main St               | Opp Direction Sideswipe                     |
| 15        | 10/12/2012 | 0.42   | Main Street                | Dry               | Property Damage Only | No Control      | South Winooski Avenue | Left Turn and Thru, Angle Broadside -->v--  |
| 15        | 2/9/2013   | 0.42   | FAU-5022 Main St           | Snow              | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 3/10/2013  | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Rear End                                    |
| 15        | 6/7/2013   | 0.42   | FAU- 5022 Main St          | Wet               | Property Damage Only | No Control      | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 8/9/2013   | 0.42   | FAU-5022 Main St           |                   | Property Damage Only | unknown         | S Winooski Ave        | Unknown                                     |
| 15        | 10/19/2013 | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Unknown                                     |
| 15        | 11/4/2013  | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 7/8/2014   | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear End                                    |
| 15        | 7/21/2014  | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Left Turns, Same Direction, Rear End v--v-- |
| 15        | 12/6/2014  | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Right Turn and Thru, Broadside ^<--         |
| 15        | 4/25/2015  | 0.42   | Main St                    | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Rear-to-rear                                |
| 15        | 5/15/2015  | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 6/6/2015   | 0.42   | Main St                    | Dry               | Property Damage Only | No Control      | S Winooski Ave        | Same Direction Sideswipe                    |
| 15        | 10/3/2015  | 0.42   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Rear End                                    |
| 15        | 6/30/2015  | 0.43   | Main St                    | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave        | Rear End                                    |
| 15        | 9/27/2014  | 0.44   | Main St                    | Dry               | Injury               | No Control      | S Winooski Ave        | No Turns, Thru moves only, Broadside ^<     |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                      | Surface Condition | Crash Type           | Traffic Signals | Intersection With         | Dir. of Collision                                              |
|-----------|------------|--------|-------------------------------------|-------------------|----------------------|-----------------|---------------------------|----------------------------------------------------------------|
| 15        | 5/23/2011  | 0.99   | ALTUS-7 (S Winooski Ave)            | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Rear End                                                       |
| 15        | 6/29/2011  | 0.99   | ALTUS-7 (S Winooski Ave)            | Dry               | Property Damage Only | No Control      | Main St                   | Rear End                                                       |
| 15        | 9/1/2011   | 0.99   | ALTUS-7 (S Winooski Ave)            | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 2/15/2012  | 0.99   | ALTUS-7 (So Winooski Ave)           | Wet               | Property Damage Only | No Control      | Main St                   | Same Direction Sideswipe                                       |
| 15        | 2/28/2012  | 0.99   | ALTUS-7 (S Winooski Ave)            | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Rear End                                                       |
| 15        | 9/23/2011  | 0.997  | ALTUS-7 (So Winooski Ave)           | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 1/28/2011  | 1      | ALTUS-7 (S Winooski Ave)            | Wet               | Property Damage Only | No Control      | Main Street               | Same Direction Sideswipe                                       |
| 15        | 2/8/2011   | 1      | ALTUS-7 (S Winooski Ave)            | Snow              | Property Damage Only | Traffic Signal  | Main Street               | Left Turn and Thru, Angle Broadside -->v--                     |
| 15        | 5/23/2011  | 1      | ALTUS-7 (S. Winooski Ave)           | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Rear End                                                       |
| 15        | 7/30/2011  | 1      | Alt. US-7 S Winooski Ave            | Wet               | Property Damage Only | Traffic Signal  | Main St                   | Rear End                                                       |
| 15        | 12/27/2011 | 1      | Alt. US-7 S Winooski Ave            | Wet               | Property Damage Only | Traffic Signal  | Main St                   | Head On                                                        |
| 15        | 4/7/2012   | 1      | Alt. US-7 S Winooski Ave/Main St    | Dry               | Property Damage Only | No Control      | S Winooski Ave            | Rear End                                                       |
| 15        | 5/4/2012   | 1      | Alt. US-7 S Winooski Ave            | Wet               | Property Damage Only | Traffic Signal  | Main St                   | Rear End                                                       |
| 15        | 6/22/2012  | 1      | Alt. US-7 S Winooski Avenue         | Dry               | Property Damage Only | No Control      | Main Street               | Same Direction Sideswipe                                       |
| 15        | 7/29/2012  | 1      | Alt. US-7 S Winooski Ave/Main St    | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave            | Rear End                                                       |
| 15        | 12/8/2012  | 1      | Alt. US-7 S Winooski Avenue         | Dry               | Property Damage Only | Traffic Signal  | Main Street               | Rear End                                                       |
| 15        | 12/13/2012 | 1      | Alt. US-7 South Winooski Avenue     | Wet               | Property Damage Only | No Control      | Main Street               | Single Vehicle Crash                                           |
| 15        | 2/4/2013   | 1      | South Winooski Avenue               | Dry               | Property Damage Only | No Control      | Main Street               | Opp Direction Sideswipe                                        |
| 15        | 5/3/2013   | 1      | Alt. US-7 S Winooski Ave            | Dry               | Property Damage Only | No Control      | Main St                   | Same Direction Sideswipe                                       |
| 15        | 9/20/2013  | 1      | Alt US-7 S Winooski Ave             | Dry               | Injury               | Traffic Signal  | Main St                   | Unknown                                                        |
| 15        | 11/1/2013  | 1      | Alt. US-7 S Winooski Ave/Main St    |                   | Property Damage Only | unknown         | S Winooski Ave            | Unknown                                                        |
| 15        | 11/9/2013  | 1      | Alt. US-7 S Winooski Ave/Main St    | Dry               | Property Damage Only | No Control      | S Winooski Ave            | Rear End                                                       |
| 15        | 11/11/2013 | 1      | Alt. US-7 S Winooski Ave            |                   | Property Damage Only | unknown         | Main St                   | Unknown                                                        |
| 15        | 11/18/2013 | 1      | Alt. US-7 S Winooski Ave            | Wet               | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 12/31/2013 | 1      | Alt. US-7 S Winooski Ave            | Unknown           | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 12/31/2013 | 1      | Alt. US-7 S Winooski Ave            | Snow              | Property Damage Only | No Control      | Main St                   | Unknown                                                        |
| 15        | 1/3/2014   | 1      | Alt. US-7 S Winooski Ave/Main St    | Snow              | Property Damage Only | Traffic Signal  | S Winooski Ave            | Rear End                                                       |
| 15        | 2/8/2014   | 1      | S Winooski Ave                      | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 5/3/2014   | 1      | Alt. US-7 S Winooski Ave            | Dry               | Injury               | No Control      | Main St                   | Rear End                                                       |
| 15        | 5/31/2014  | 1      | Alt. US-7 Winooski Ave./188 Main St | Dry               | Property Damage Only | No Control      | Main St                   | Same Direction Sideswipe                                       |
| 15        | 9/16/2014  | 1      | Alt. US-7 S Winooski Ave            | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 9/20/2014  | 1      | Alt. US-7 S Winooski Ave/Main St    | Dry               | Injury               | Traffic Signal  | S Winooski Ave            | Single Vehicle Crash                                           |
| 15        | 11/9/2014  | 1      | S Winooski                          | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Left Turn and Thru, Angle Broadside -->v--                     |
| 15        | 12/8/2014  | 1      | Alt. US 7 S Winooski Ave            | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Rear End                                                       |
| 15        | 12/9/2014  | 1      | Alt. US 7 S. Winooski Av./Main St   | Slush             | Property Damage Only | Traffic Signal  | S Winooski Ave            | Left Turn and Thru, Angle Broadside -->v--                     |
| 15        | 1/23/2015  | 1      | Alt. US 7 S. Winooski Av./Main St   | Dry               | Injury               | Traffic Signal  | S Winooski Ave            | Left Turn and Thru, Angle Broadside -->v--                     |
| 15        | 1/31/2015  | 1      | Alt. US 7 S Winooski Ave            | Wet               | Property Damage Only | No Control      | Main St                   | Unknown                                                        |
| 15        | 5/28/2015  | 1      | Alt. US-7 S. Winooski Av./Main St   | Dry               | Property Damage Only | Traffic Signal  | S Winooski Ave            | Left Turn and Thru, Angle Broadside -->v--                     |
| 15        | 6/17/2015  | 1      | S Winooski Ave                      | Dry               | Property Damage Only | No Control      | Intersection With Main St | Unknown                                                        |
| 15        | 6/29/2015  | 1      | S Winooski Ave                      | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Left Turn and Thru, Angle Broadside -->v--                     |
| 15        | 7/2/2015   | 1      | Alt. US-7 S Winooski Ave            | Dry               | Property Damage Only | Traffic Signal  | Main St                   | Same Direction Sideswipe                                       |
| 15        | 8/11/2015  | 1      | Alt US-7 South Winooski Ave         | Wet               | Property Damage Only | Traffic Signal  | Main St                   | Head On                                                        |
| 15        | 12/15/2015 | 1      | Alt. US-7 S. Winooski Av./Main St   | Wet               | Property Damage Only | Traffic Signal  | S Winooski Ave            | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 15        | 10/4/2013  | 1.02   | Alt. US-7 S Winooski Av             | Dry               | Injury               | No Control      | Main St                   | Unknown                                                        |
| 15        | 9/6/2013   | 1.03   | Alt. US-7 (136 S Winooski Ave)      | Dry               | Property Damage Only | Traffic Signal  | MAin St                   | Same Direction Sideswipe                                       |
| 16        | 2/8/2015   | 0.5    | FAU-5022 (250 Main St)              | Snow              | Property Damage Only | No Control      | Side Driveway             | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 4/10/2012  | 0.52   | FAU 5022 (Main Stret)               | Dry               | Injury               | Traffic Signal  | S Union St                | Rear End                                                       |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address             | Surface Condition | Crash Type           | Traffic Signals                       | Intersection With       | Dir. of Collision                                              |
|-----------|------------|--------|----------------------------|-------------------|----------------------|---------------------------------------|-------------------------|----------------------------------------------------------------|
| 16        | 4/24/2012  | 0.52   | FAU 5022 (Main St)         | Wet               | Property Damage Only | Traffic Signal                        | S Union St              | Same Direction Sideswipe                                       |
| 16        | 8/22/2013  | 0.52   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 6/22/2011  | 0.53   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal                        | South Union St          | Rear End                                                       |
| 16        | 12/8/2011  | 0.53   | FAU 5022 (Main Street)     | Snow              | Property Damage Only | Traffic Signal                        | S Union St              | Same Direction Sideswipe                                       |
| 16        | 4/15/2012  | 0.53   | FAU-5022 Main St           | Dry               | Injury               | Traffic Signal                        | S Union St              | Single Vehicle Crash                                           |
| 16        | 5/22/2012  | 0.53   | FAU-5022 Main St           | Dry               | Property Damage Only | All-way Flasher (Red on Cross Street) | S Union St              | Unknown                                                        |
| 16        | 7/12/2012  | 0.53   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control                            | S Union St              | Rear-to-rear                                                   |
| 16        | 8/4/2012   | 0.53   | FAU-5022 (250 Main St)     | Dry               | Property Damage Only | No Control                            | So Union St/ College St | Unknown                                                        |
| 16        | 10/25/2012 | 0.53   | FAU-5022 Main Street       | Dry               | Property Damage Only | Traffic Signal                        | South Union Street      | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 1/2/2013   | 0.53   | FAU-5022 Main Street       | Wet               | Property Damage Only | No Control                            | South Union Street      | Rear End                                                       |
| 16        | 1/20/2013  | 0.53   | FAU-5022 Main Street       | Unknown           | Property Damage Only | Traffic Signal                        | South Union Street      | Unknown                                                        |
| 16        | 1/28/2013  | 0.53   | FAU-5022 Main Street       | Snow              | Property Damage Only | No Control                            | South Union Street      | Rear End                                                       |
| 16        | 3/26/2013  | 0.53   | FAU-5022 Main St           | Dry               | Injury               | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 1/20/2014  | 0.53   | FAU-5022 Main St           | Ice               | Property Damage Only | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 1/29/2014  | 0.53   | FAU-5022 Main St           | Slush             | Property Damage Only | unknown                               | S Union St              | Single Vehicle Crash                                           |
| 16        | 2/5/2014   | 0.53   | FAU-5022 Main St           | Snow              | Property Damage Only | No Control                            | S Union St              | Unknown                                                        |
| 16        | 2/17/2014  | 0.53   | Main St                    | Dry               | Injury               | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 3/11/2014  | 0.53   | FAU-5022 Main St           | Wet               | Property Damage Only | No Control                            | S Union St              | Rear End                                                       |
| 16        | 4/19/2014  | 0.53   | FAU-5022 Main St           | Dry               | Property Damage Only | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 7/5/2014   | 0.53   | FAU-5022 Main St           | Dry               | Injury               | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 11/17/2014 | 0.53   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control                            | S Union St              | Unknown                                                        |
| 16        | 2/20/2015  | 0.53   | Main St                    | Wet               | Property Damage Only | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 4/29/2015  | 0.53   | Main St                    | Dry               | Property Damage Only | Traffic Signal                        | S Union St              | Rear End                                                       |
| 16        | 5/1/2015   | 0.53   | FAU-5022 Main St           | Dry               | Property Damage Only | No Control                            | S Union St              | Same Direction Sideswipe                                       |
| 16        | 7/28/2015  | 0.53   | Main St                    | Dry               | Property Damage Only | Traffic Signal                        | S Union St              | No Turns, Thru moves only, Broadside ^<                        |
| 16        | 12/5/2015  | 0.53   | Main St                    | Dry               | Property Damage Only | No Control                            | S Union St              | Same Direction Sideswipe                                       |
| 16        | 9/9/2014   | 0.54   | FAU-5022 (266 Main St)     | Dry               | Property Damage Only | No Control                            | S Union St              | Rear End                                                       |
| 16        | 1/20/2011  | 0.55   | FAU (266 Main Street)      | Dry               | Property Damage Only | No Control                            | S Union Street          | Same Direction Sideswipe                                       |
| 16        | 6/10/2011  | 0.56   | FAU-5022 (275 Main St)     |                   | Injury               | No Control                            | Edmunds School          | Right Turn and Thru, Broadside ^<--                            |
| 16        | 10/8/2012  | 0.56   | FAU-5022 (275 Main Street) | Dry               | Property Damage Only | No Control                            | N/A                     | Same Direction Sideswipe                                       |
| 17        | 1/8/2011   | 0      | US-2 Main St.              | Snow              | Property Damage Only | Traffic Signal                        | S. Willard St.          | Rear End                                                       |
| 17        | 2/5/2011   | 0      | US-2 (Main Street)         | Wet               | Property Damage Only | Traffic Signal                        | S Willard Street        | Left Turn and Thru, Angle Broadside -->v--                     |
| 17        | 2/15/2011  | 0      | US-2 (Main Street)         | Dry               | Property Damage Only | Traffic Signal                        | Willard Street          | Same Direction Sideswipe                                       |
| 17        | 3/20/2011  | 0      | US-2 (253 Main Street)     | Dry               | Property Damage Only | Traffic Signal                        | S Willard Street        | Rear End                                                       |
| 17        | 5/21/2011  | 0      | US-2 Main Street           |                   | Property Damage Only | unknown                               | South Willard Street    | Unknown                                                        |
| 17        | 9/9/2011   | 0      | US-2 Main St               | Dry               | Property Damage Only | Traffic Signal                        | S Willard St            | Rear End                                                       |
| 17        | 10/6/2011  | 0      | US-2 Main St               | Dry               | Property Damage Only | Traffic Signal                        | S Willard St            | Same Direction Sideswipe                                       |
| 17        | 10/30/2011 | 0      | US-2 (Main Street)         | Dry               | Property Damage Only | Traffic Signal                        | Willard St              | Rear End                                                       |
| 17        | 1/15/2012  | 0      | US-2 (Main Street)         | Wet               | Property Damage Only | Traffic Signal                        | S Willard St            | Rear End                                                       |
| 17        | 4/16/2012  | 0      | US-2 Main St               | Dry               | Property Damage Only | No Control                            | S Willard St            | Rear End                                                       |
| 17        | 9/3/2012   | 0      | Main St                    | Dry               | Property Damage Only | No Control                            | S Willard St            | No Turns, Thru moves only, Broadside ^<                        |
| 17        | 9/22/2012  | 0      | US-2 Main St               | Wet               | Property Damage Only | Traffic Signal                        | S Willard St            | Left Turn and Thru, Angle Broadside -->v--                     |
| 17        | 11/2/2012  | 0      | US-2 Main Street           | Dry               | Property Damage Only | Traffic Signal                        | South Willard Street    | Same Direction Sideswipe                                       |
| 17        | 4/2/2013   | 0      | US-2 Main St               | Dry               | Property Damage Only | Traffic Signal                        | S Willard St            | Left Turn and Thru, Broadside v<--                             |
| 17        | 4/3/2013   | 0      | US-2 Main Street           | Dry               | Property Damage Only | Traffic Signal                        | South Willard Street    | Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^-- |
| 17        | 4/17/2013  | 0      | US-2 Main St               | Dry               | Property Damage Only | Traffic Signal                        | S Willard St            | Unknown                                                        |
| 17        | 8/13/2013  | 0      | US-2 Main St               | Wet               | Property Damage Only | Traffic Signal                        | S Willard St            | Left Turn and Thru, Angle Broadside -->v--                     |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address              | Surface Condition            | Crash Type           | Traffic Signals                 | Intersection With     | Dir. of Collision                          |
|-----------|------------|--------|-----------------------------|------------------------------|----------------------|---------------------------------|-----------------------|--------------------------------------------|
| 17        | 11/18/2013 | 0      | US-2 Main St                | Dry                          | Property Damage Only | unknown                         | S Willard St          | Rear End                                   |
| 17        | 12/28/2013 | 0      | US-2 Main St                | Wet                          | Property Damage Only | Traffic Signal                  | S Willard St          | No Turns, Thru moves only, Broadside ^<    |
| 17        | 2/21/2014  | 0      | US-2 Main St                | Wet                          | Property Damage Only | Traffic Signal                  | s Willard St          | Rear End                                   |
| 17        | 4/3/2014   | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 4/8/2014   | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 5/1/2014   | 0      | Main St                     | Wet                          | Injury               | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 5/25/2014  | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 6/2/2014   | 0      | US-2 Main St                | Dry                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 7/23/2014  | 0      | US-2 Main St                | Dry                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 8/5/2014   | 0      | US-2 Main St                | Dry                          | Injury               | Traffic Signal                  | S Willard St          | Left Turn and Thru, Angle Broadside -->v-- |
| 17        | 8/13/2014  | 0      | US-2 Main St                | Wet                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 8/23/2014  | 0      | Main St                     | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 8/30/2014  | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Same Direction Sideswipe                   |
| 17        | 9/5/2014   | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Same Direction Sideswipe                   |
| 17        | 10/2/2014  | 0      | US-2 Main St                | Dry                          | Property Damage Only | Stop Signs on Cross Street Only | S Willard St          | Rear End                                   |
| 17        | 11/7/2014  | 0      | US-2 Main St                | Other - Explain in Narrative | Property Damage Only | Traffic Signal                  | S Willard St          | Unknown                                    |
| 17        | 12/11/2014 | 0      | Main St                     | Snow                         | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 1/1/2015   | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Same Direction Sideswipe                   |
| 17        | 1/3/2015   | 0      | Main St @ Willard St        | Snow                         | Property Damage Only | Traffic Signal                  | Main St @ Willard St  | Left Turn and Thru, Angle Broadside -->v-- |
| 17        | 2/2/2015   | 0      | US-2 Main St                | Snow                         | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 2/28/2015  | 0      | US-2 Main St                | Dry                          | Property Damage Only | No Control                      | S Willard St          | Unknown                                    |
| 17        | 4/23/2015  | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Same Direction Sideswipe                   |
| 17        | 7/3/2015   | 0      | Main St                     | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Rear End                                   |
| 17        | 8/29/2015  | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Unknown                                    |
| 17        | 9/5/2015   | 0      | US-2 Main St                | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Left Turn and Thru, Angle Broadside -->v-- |
| 17        | 3/20/2011  | 0.01   | US-2 (350 Main St)          | Dry                          | Property Damage Only | Traffic Signal                  | So Willard St         | Rear End                                   |
| 17        | 2/24/2011  | 0.02   | US-2 (360 Main St)          | Dry                          | Property Damage Only | No Control                      | S Williams St         | Same Direction Sideswipe                   |
| 17        | 7/30/2015  | 0.02   | Main St                     | Wet                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 7/29/2015  | 0.03   | Main St                     | Dry                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 10/16/2013 | 0.7    | FAU-5022 Main St            | Dry                          | Property Damage Only | No Control                      | S Willard St          | Unknown                                    |
| 17        | 4/13/2012  | 0.71   | FAU-5022Main St             | Dry                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 4/14/2012  | 0.71   | FAU-5022 Main St            | Dry                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 4/16/2012  | 0.71   | FAU-5022 Main St            | Dry                          | Property Damage Only | Traffic Signal                  | Prospect St           | Rear End                                   |
| 17        | 8/1/2012   | 0.71   | FAU-5022 Main St            | Dry                          | Property Damage Only | No Control                      | S Willard St          | Rear End                                   |
| 17        | 11/10/2012 | 0.71   | FAU-5022 Main Street        | Dry                          | Injury               | No Control                      | South Prospect Street | Rear End                                   |
| 17        | 7/9/2013   | 2.09   | US-7 Riverside Ave          |                              | Property Damage Only | unknown                         | N Winooski Ave        | Unknown                                    |
| 17        | 8/7/2015   | 2.09   | US-7 Riverside Ave          | Dry                          | Property Damage Only | Traffic Signal                  | N Winooski Ave        | Same Direction Sideswipe                   |
| 17        | 10/10/2011 | 2.1    | US-7 S Willard St           | Dry                          | Property Damage Only | Traffic Signal                  | Main St               | Rear End                                   |
| 17        | 7/4/2013   | 2.1    | US-7 Riverside Ave          |                              | Property Damage Only | unknown                         | N Winooski Ave        | Unknown                                    |
| 17        | 10/5/2013  | 2.1    | US-7 Riverside Ave          | Dry                          | Property Damage Only | Traffic Signal                  | N Winooski Ave        | Rear End                                   |
| 17        | 8/27/2011  | 2.12   | US-7 S Willard St/Main St   | Dry                          | Injury               | Traffic Signal                  | S Willard St          | Left Turn and Thru, Angle Broadside -->v-- |
| 17        | 10/31/2011 | 2.12   | US-7 (S Willard Street)     | Dry                          | Property Damage Only | Traffic Signal                  | Main St               | Right Turn and Thru, Broadside ^<--        |
| 17        | 3/26/2012  | 2.12   | US-7 (S Willard Street)     | Dry                          | Property Damage Only | Traffic Signal                  | Main St               | Rear End                                   |
| 17        | 5/29/2012  | 2.12   | US-7 South Willard St       | Dry                          | Property Damage Only | Traffic Signal                  | Main St               | Rear End                                   |
| 17        | 6/29/2012  | 2.12   | US-7 S. Willard St./Main St | Dry                          | Property Damage Only | Traffic Signal                  | S Willard St          | Left Turn and Thru, Angle Broadside -->v-- |
| 17        | 7/7/2012   | 2.12   | US-7 S Willard St           | Dry                          | Injury               | Traffic Signal                  | Main St               | Rear End                                   |
| 17        | 9/8/2012   | 2.12   | US-7 S Willard St           | Dry                          | Property Damage Only | Traffic Signal                  | Main St               | Rear End                                   |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address                     | Surface Condition            | Crash Type           | Traffic Signals           | Intersection With                   | Dir. of Collision                                             |
|-----------|------------|--------|------------------------------------|------------------------------|----------------------|---------------------------|-------------------------------------|---------------------------------------------------------------|
| 17        | 9/20/2012  | 2.12   | US-7 S Willard St                  | Dry                          | Property Damage Only | Traffic Signal            | Main St                             | Rear End                                                      |
| 17        | 1/22/2013  | 2.12   | US-7 South Willard Street          | Wet                          | Property Damage Only | Traffic Signal            | Main Street                         | Rear End                                                      |
| 17        | 9/4/2013   | 2.12   | US-7 S Willard St                  | Dry                          | Property Damage Only | Traffic Signal            | Main St                             | Same Direction Sideswipe                                      |
| 17        | 11/2/2013  | 2.12   | US-7 S Willard St/Main St          | Wet                          | Injury               | Traffic Signal            | S Willard St                        | Left Turn and Thru, Angle Broadside -->v--                    |
| 17        | 3/14/2014  | 2.12   | US-7 S. Willard St./Main St        | Sand, mud, dirt, oil, gravel | Property Damage Only | Traffic Signal            | S Willard St                        | Rear End                                                      |
| 17        | 8/7/2014   | 2.12   | US-7 S Willard St                  | Wet                          | Property Damage Only | Traffic Signal            | Main St                             | Rear End                                                      |
| 17        | 8/11/2014  | 2.12   | S Willard St                       | Dry                          | Property Damage Only | Traffic Signal            | Main St                             | Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv-- |
| 17        | 9/15/2014  | 2.12   | S Willard St                       | Dry                          | Property Damage Only | unknown                   | Main St                             | Rear End                                                      |
| 17        | 11/5/2014  | 2.12   | S Willard St                       | Unknown                      | Injury               | Traffic Signal (Flashing) | Main St                             | Right Turn and Thru, Broadside ^<--                           |
| 17        | 2/10/2015  | 2.12   | S Willard St                       | Slush                        | Property Damage Only | Traffic Signal            | Main St                             | Rear End                                                      |
| 17        | 4/6/2015   | 2.12   | US-7 S Willard St                  | Unknown                      | Property Damage Only | No Control                | Main St                             | Unknown                                                       |
| 18        | 1/23/2011  | 0      | FAU 5050 (S Prospect Street)       | Dry                          | Property Damage Only | No Control                | Main Street                         | Same Direction Sideswipe                                      |
| 18        | 5/11/2012  | 0      | FAU-5050 S Prospect St             | Dry                          | Property Damage Only | Traffic Signal            | Main St                             | Same Direction Sideswipe                                      |
| 18        | 7/17/2012  | 0      | FAU-5050 S Prospect St             | Wet                          | Property Damage Only | unknown                   | Main St                             | Rear End                                                      |
| 18        | 9/12/2012  | 0      | FAU-5050 S Prospect St             | Dry                          | Property Damage Only | Traffic Signal            | Main St                             | Same Direction Sideswipe                                      |
| 18        | 7/9/2013   | 0      | FAU-5050 (2 South Prospect Street) | Dry                          | Property Damage Only | No Control                | Main Street                         | Head On                                                       |
| 18        | 12/13/2015 | 0      | FAU-5050 S Prospect St             | Dry                          | Property Damage Only | Traffic Signal            | Main St                             | Same Direction Sideswipe                                      |
| 18        | 11/14/2012 | 0.01   | FAU-5050 South Prospect Street     | Dry                          | Property Damage Only | No Control                | Main Street                         | No Turns, Thru moves only, Broadside ^<                       |
| 18        | 8/13/2013  | 0.21   | US-2 Main St                       |                              | Property Damage Only | unknown                   | S Prospect St                       | Unknown                                                       |
| 18        | 5/11/2015  | 0.21   | Main St                            | Dry                          | Property Damage Only | No Control                | S Prospect St                       | Rear End                                                      |
| 18        | 1/13/2011  | 0.23   | US-2 Main St.                      | Slush                        | Property Damage Only | Traffic Signal            | S. Prospect St.                     | Rear End                                                      |
| 18        | 1/23/2011  | 0.23   | US-2 (Main Street)                 | Not Reported                 | Injury               | Traffic Signal            | S Prospect                          | Rear End                                                      |
| 18        | 1/27/2011  | 0.23   | US-2 (Main Street)                 | Wet                          | Property Damage Only | No Control                | S Prospect Street                   | Rear End                                                      |
| 18        | 2/5/2011   | 0.23   | US-2 (Main Street)                 | Snow                         | Property Damage Only | No Control                | S Prospect Street                   | Rear End                                                      |
| 18        | 2/26/2011  | 0.23   | US-2 (Main Street)                 | Dry                          | Property Damage Only | Traffic Signal            | Prospect Street                     | Same Direction Sideswipe                                      |
| 18        | 4/19/2011  | 0.23   | US-2 Main St / S. Prospect Street  | Dry                          | Injury               | Traffic Signal            | Main Street / South Prospect Street | Rear End                                                      |
| 18        | 5/11/2011  | 0.23   | US-2 (590 Main St)                 | Dry                          | Property Damage Only | Traffic Signal            | Prospect St                         | Rear End                                                      |
| 18        | 7/16/2011  | 0.23   | US-2 (Main St)                     | Dry                          | Injury               | Traffic Signal            | S Prospect St                       | Rear End                                                      |
| 18        | 8/10/2011  | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | Traffic Signal            | So Prospect St                      | Same Direction Sideswipe                                      |
| 18        | 9/15/2011  | 0.23   | US-2 Main St                       | Unknown                      | Property Damage Only | Traffic Signal            | S Prospect St                       | Rear End                                                      |
| 18        | 4/18/2012  | 0.23   | US-2 (Main Street)                 | Dry                          | Property Damage Only | No Control                | South Prospect                      | Left and Right Turns, Simultaneous Turn Crash --v--           |
| 18        | 5/14/2012  | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | All-way Stop Signs        | So Prospect St                      | Rear End                                                      |
| 18        | 6/2/2012   | 0.23   | US-2 Main Street                   | Wet                          | Property Damage Only | Traffic Signal            | South Prospect Street               | Rear End                                                      |
| 18        | 7/5/2012   | 0.23   | US-2 Main Street                   | Dry                          | Property Damage Only | Traffic Signal            | South Prospect Street               | Rear End                                                      |
| 18        | 7/11/2012  | 0.23   | US-2 Main St                       |                              | Property Damage Only | Traffic Signal            | S Prospect St                       | Rear End                                                      |
| 18        | 7/16/2012  | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | Traffic Signal            | S Prospect St                       | Same Direction Sideswipe                                      |
| 18        | 9/13/2012  | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | Traffic Signal            | S Prospect St                       | Rear End                                                      |
| 18        | 9/27/2012  | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | Traffic Signal            | S Prospect St                       | Same Direction Sideswipe                                      |
| 18        | 10/2/2012  | 0.23   | US-2 Main Street                   | Dry                          | Property Damage Only | Traffic Signal            | South Prospect Street               | Rear End                                                      |
| 18        | 10/10/2012 | 0.23   | US-2 Main St/So Prospect St        | Dry                          | Injury               | Traffic Signal            | Main St                             | Unknown                                                       |
| 18        | 11/10/2012 | 0.23   | US-2 Main St                       | Dry                          | Injury               | No Control                | S Prospect St                       | Same Direction Sideswipe                                      |
| 18        | 1/3/2013   | 0.23   | US-2 Main Street                   | Slush                        | Property Damage Only | Traffic Signal            | South Prospect Street               | Rear End                                                      |
| 18        | 1/6/2013   | 0.23   | US-2 Main Street                   | Slush                        | Property Damage Only | Traffic Signal            | South Prospect Street               | Rear End                                                      |
| 18        | 2/6/2013   | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | Traffic Signal            | S Prospect St                       | Rear End                                                      |
| 18        | 2/22/2013  | 0.23   | US-2 Main Street                   | Wet                          | Property Damage Only | Traffic Signal            | South Prospect Street               | Rear End                                                      |
| 18        | 3/7/2013   | 0.23   | US-2 Main St                       | Dry                          | Property Damage Only | Traffic Signal            | S Prospect St                       | Rear End                                                      |
| 18        | 6/6/2013   | 0.23   | US-2 Main St                       | Wet                          | Property Damage Only | No Control                | S Prospect St                       | Same Direction Sideswipe                                      |

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FIGURE 5-A

| Int. ID # | Date       | AOT MM | Street Address         | Surface Condition | Crash Type           | Traffic Signals | Intersection With | Dir. of Collision                                    |
|-----------|------------|--------|------------------------|-------------------|----------------------|-----------------|-------------------|------------------------------------------------------|
| 18        | 6/6/2013   | 0.23   | US-2 Main St           | Wet               | Property Damage Only | No Control      | Prospect St       | Rear End                                             |
| 18        | 6/18/2013  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 8/15/2013  | 0.23   | US-2 Main St           | Unknown           | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 10/4/2013  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | No Control      | S Prospect St     | Rear End                                             |
| 18        | 10/23/2013 | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect        | Same Direction Sideswipe                             |
| 18        | 11/21/2013 | 0.23   | US-2 Main St           | Dry               | Injury               | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 1/20/2014  | 0.23   | US-2 Main St           |                   | Property Damage Only | unknown         | South Prospect St | Unknown                                              |
| 18        | 1/28/2014  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Same Direction Sideswipe                             |
| 18        | 3/13/2014  | 0.23   | Main St                | Snow              | Property Damage Only | Traffic Signal  | S Prospect St     | Left Turn and Thru, Angle Broadside -->v--           |
| 18        | 4/2/2014   | 0.23   | Main St                | Wet               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 5/7/2014   | 0.23   | Main St                |                   | Property Damage Only | Traffic Signal  | S Prospect St     | Same Direction Sideswipe                             |
| 18        | 5/14/2014  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | No Turns, Thru moves only, Broadside ^<              |
| 18        | 6/6/2014   | 0.23   | US-2 Main St           | Dry               | Property Damage Only | No Control      | S Prospect St     | Rear End                                             |
| 18        | 6/18/2014  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Same Direction Sideswipe                             |
| 18        | 8/29/2014  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Right Turn and Thru, Angle Broadside -->^--          |
| 18        | 11/1/2014  | 0.23   | Main St                | Wet               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 12/7/2014  | 0.23   | Main St                | Dry               | Injury               | Traffic Signal  | S Prospect St     | Unknown                                              |
| 18        | 12/23/2014 | 0.23   | US-2 Main St           | Wet               | Property Damage Only | No Control      | S Prospect St     | Rear End                                             |
| 18        | 12/30/2014 | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 1/5/2015   | 0.23   | Main St                | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 2/5/2015   | 0.23   | Main St                | Snow              | Property Damage Only | unknown         | S Prospect St     | Single Vehicle Crash                                 |
| 18        | 3/11/2015  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Left and Right Turns, Simultaneous Turn Crash --vv-- |
| 18        | 3/29/2015  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 5/6/2015   | 0.23   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 5/8/2015   | 0.23   | Main St                | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 6/10/2015  | 0.23   | Main St                | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Same Direction Sideswipe                             |
| 18        | 8/27/2015  | 0.23   | US-2 Main St           | Dry               | Property Damage Only | No Control      | Summit St         | Rear End                                             |
| 18        | 10/16/2015 | 0.23   | Main St                | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Head On                                              |
| 18        | 11/10/2015 | 0.23   | US-2 Main St           | Dry               | Property Damage Only | No Control      | S Prospect St     | Same Direction Sideswipe                             |
| 18        | 12/16/2015 | 0.23   | Main St                | Dry               | Injury               | Traffic Signal  | S Prospect St     | No Turns, Thru moves only, Broadside ^<              |
| 18        | 12/16/2015 | 0.23   | Main St                | Dry               | Property Damage Only | unknown         | S Prospect St     | Rear End                                             |
| 18        | 3/20/2011  | 0.24   | US-2 (Main St)         | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 8/11/2011  | 0.24   | US-2 (Main Street)     | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 8/29/2013  | 0.24   | US-2 (461 Main Street) |                   | Property Damage Only | unknown         | South Prospect St | Unknown                                              |
| 18        | 9/1/2013   | 0.24   | Main St                | Dry               | Property Damage Only | No Control      | Prosepect St      | Same Direction Sideswipe                             |
| 18        | 8/5/2015   | 0.24   | US-2 Main St           | Dry               | Property Damage Only | Traffic Signal  | S Prospect St     | Rear End                                             |
| 18        | 10/17/2015 | 0.25   | Main St                | Dry               | Property Damage Only | No Control      | S Prospect St     | Rear End                                             |
| 18        | 7/29/2014  | 0.26   | Main St                | Dry               | Property Damage Only | No Control      | S Prospect St     | Same Direction Sideswipe                             |



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## **Adjustment Factors (Seasonal / DHV and Growth)**



FIGURE 5-A

|  <b>Computations</b> |                            |                                     |                     |
|-------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------|---------------------|
|                                                                                                       |                            | Project: Burlington Town Center TIS | Project #: 57881.00 |
|                                                                                                       |                            | Location: Burlington, VT            | Sheet: _____        |
|                                                                                                       |                            | Calculated by: ELQ                  | Date: 12/6/16       |
|                                                                                                       |                            | Checked by: _____                   | Date: _____         |
|                                                                                                       |                            | Title: DHV Adjustment Factors       |                     |
|                                                                                                       |                            |                                     |                     |
| <b>Year: 2010</b>                                                                                     |                            |                                     |                     |
|                                                                                                       |                            | TM Count: 18<br>*AADT from ATR      |                     |
| ATR ID                                                                                                | D162                       | ATR/CTC Year                        | 2016                |
|                                                                                                       |                            | ATR/CTC AADT*                       | 16,517              |
|                                                                                                       |                            | 2016-2010 Growth                    | 0.97                |
|                                                                                                       |                            | Corr. AADT                          | 16,021              |
| K Factor                                                                                              | 0.106 Poll Group 3         | DHV (Equation)                      | use k factor        |
| Monthly Adjust                                                                                        | 1                          | DHV (K-Factor)                      | 1,698               |
| DHV Adjustment                                                                                        | 1.22                       | Corr. Count                         | 1,393               |
| 2010 - 2019 Growth                                                                                    | 1.050                      | TM Count Year                       | 2010                |
| <b>Total Adjustment</b>                                                                               | <b>1.28</b> (min. of 1.00) | Analysis Year 1                     | 2019                |
| <b>Year: 2013</b>                                                                                     |                            |                                     |                     |
|                                                                                                       |                            | TM Count: 10<br>*AADT from ATR      |                     |
| ATR ID                                                                                                | D155                       | ATR/CTC Year                        | 2013                |
|                                                                                                       |                            | ATR/CTC AADT*                       | 11,300              |
|                                                                                                       |                            | 2013-2010 Growth                    | 0.98                |
|                                                                                                       |                            | Corr. AADT                          | 11,300              |
| K Factor                                                                                              | 0.106 Poll Group 3         | DHV (Equation)                      | use k factor        |
| Monthly Adjust                                                                                        | 1                          | DHV (K-Factor)                      | 1,198               |
| DHV Adjustment                                                                                        | 1.15                       | Corr. Count                         | 1,046               |
| 2010 - 2019 Growth                                                                                    | 1.050                      | TM Count Year                       | 2010                |
| <b>Total Adjustment</b>                                                                               | <b>1.20</b> (min. of 1.00) | Analysis Year 1                     | 2019                |
| <b>Year: 2014</b>                                                                                     |                            |                                     |                     |
|                                                                                                       |                            | TM Count: 5<br>*AADT from ATR       |                     |
| ATR ID                                                                                                | D096                       | ATR/CTC Year                        | 2016                |
|                                                                                                       |                            | ATR/CTC AADT*                       | 17,705              |
|                                                                                                       |                            | 2016-2014 Growth                    | 0.99                |
|                                                                                                       |                            | Corr. AADT                          | 17,528              |
| K Factor                                                                                              | 0.106 Poll Group 3         | DHV (Equation)                      | use k factor        |
| Monthly Adjust                                                                                        | 1                          | DHV (K-Factor)                      | 1,858               |
| DHV Adjustment                                                                                        | 1.24                       | Corr. Count                         | 1,497               |
| 2014 - 2019 Growth                                                                                    | 1.030                      | TM Count Year                       | 2014                |
| <b>Total Adjustment</b>                                                                               | <b>1.28</b> (min. of 1.00) | Analysis Year 1                     | 2019                |
| <b>Year: 2015</b>                                                                                     |                            |                                     |                     |
|                                                                                                       |                            | TM Count: 17<br>*AADT from ATR      |                     |
| ATR ID                                                                                                | D161                       | ATR/CTC Year                        | 2016                |
|                                                                                                       |                            | ATR/CTC AADT*                       | 14,218              |
|                                                                                                       |                            | 2016-2015 Growth                    | 0.99                |
|                                                                                                       |                            | Corr. AADT                          | 14,076              |
| K Factor                                                                                              | 0.106 Poll Group 3         | DHV (Equation)                      | use k factor        |
| Monthly Adjust                                                                                        | 1                          | DHV (K-Factor)                      | 1,492               |
| DHV Adjustment                                                                                        | 1.21                       | Corr. Count                         | 1,232               |
| 2015 - 2019 Growth                                                                                    | 1.020                      | TM Count Year                       | 2015                |
| <b>Total Adjustment</b>                                                                               | <b>1.24</b> (min. of 1.00) | Analysis Year 1                     | 2019                |
| <b>Year: 2016</b>                                                                                     |                            |                                     |                     |
|                                                                                                       |                            | TM Count: 16<br>*AADT from ATR      |                     |
| ATR ID                                                                                                | D161                       | ATR/CTC Year                        | 2016                |
|                                                                                                       |                            | ATR/CTC AADT*                       | 14,218              |
|                                                                                                       |                            | 2016-2016 Growth                    | 1.00                |
|                                                                                                       |                            | Corr. AADT                          | 14,218              |
| K Factor                                                                                              | 0.106 Poll Group 3         | DHV (Equation)                      | use k factor        |
| Monthly Adjust                                                                                        | 1                          | DHV (K-Factor)                      | 1,507               |
| DHV Adjustment                                                                                        | 1.11                       | Corr. Count                         | 1,355               |
| 2016 - 0 Growth                                                                                       | 1.020                      | TM Count Year                       | 2016                |
| <b>Total Adjustment</b>                                                                               | <b>1.13</b> (min. of 1.00) | Analysis Year 1                     | 0                   |

## 2010 TO 2015 GROWTH FACTORS

The 5-year growth factors shown in the tables below are based on AADTs from VTrans Continuous Traffic Counters (CTC). Each CTC is assigned to a Growth Factor Group and the factors for each group are calculated based on the average ratio of the 2015 AADT to the prior year AADT for each CTC in the group.

| Growth Factor Group 1: Rural<br>- This is the default group if a location does not fit another group - |      |      |      |      |      |  |
|--------------------------------------------------------------------------------------------------------|------|------|------|------|------|--|
| To \ From                                                                                              | 2010 | 2011 | 2012 | 2013 | 2014 |  |
| 2010                                                                                                   | 1.00 |      |      |      |      |  |
| 2011                                                                                                   | 1.01 | 1.00 |      |      |      |  |
| 2012                                                                                                   | 1.01 | 1.01 | 1.00 |      |      |  |
| 2013                                                                                                   | 1.02 | 1.02 | 1.01 | 1.00 |      |  |
| 2014                                                                                                   | 1.02 | 1.03 | 1.02 | 1.01 | 1.00 |  |
| 2015                                                                                                   | 1.03 | 1.05 | 1.03 | 1.03 | 1.05 |  |

| Growth Factor Group 2: Urban<br>- For locations within a designated federal aid urban (FAU) area - |      |      |      |      |      |  |
|----------------------------------------------------------------------------------------------------|------|------|------|------|------|--|
| To \ From                                                                                          | 2010 | 2011 | 2012 | 2013 | 2014 |  |
| 2010                                                                                               | 1.00 |      |      |      |      |  |
| 2011                                                                                               | 1.00 | 1.00 |      |      |      |  |
| 2012                                                                                               | 1.00 | 1.01 | 1.00 |      |      |  |
| 2013                                                                                               | 1.00 | 1.02 | 1.00 | 1.00 |      |  |
| 2014                                                                                               | 0.99 | 1.04 | 1.00 | 1.00 | 1.00 |  |
| 2015                                                                                               | 0.99 | 1.05 | 1.00 | 1.00 | 1.01 |  |

| Growth Factor Group 3: Interstate<br>- For locations on I-89, I-91 or I-93 - |      |      |      |      |      |  |
|------------------------------------------------------------------------------|------|------|------|------|------|--|
| To \ From                                                                    | 2010 | 2011 | 2012 | 2013 | 2014 |  |
| 2010                                                                         | 1.00 |      |      |      |      |  |
| 2011                                                                         | 1.01 | 1.00 |      |      |      |  |
| 2012                                                                         | 1.02 | 1.01 | 1.00 |      |      |  |
| 2013                                                                         | 1.02 | 1.02 | 1.01 | 1.00 |      |  |
| 2014                                                                         | 1.03 | 1.03 | 1.03 | 1.02 | 1.00 |  |
| 2015                                                                         | 1.04 | 1.04 | 1.04 | 1.05 | 1.04 |  |

| Growth Factor Group 4: Ski<br>- For locations on ski access roads - |      |      |      |      |      |  |
|---------------------------------------------------------------------|------|------|------|------|------|--|
| To \ From                                                           | 2010 | 2011 | 2012 | 2013 | 2014 |  |
| 2010                                                                | 1.00 |      |      |      |      |  |
| 2011                                                                | 1.02 | 1.00 |      |      |      |  |
| 2012                                                                | 1.03 | 1.04 | 1.00 |      |      |  |
| 2013                                                                | 1.05 | 1.07 | 1.05 | 1.00 |      |  |
| 2014                                                                | 1.07 | 1.11 | 1.10 | 1.03 | 1.00 |  |
| 2015                                                                | 1.08 | 1.14 | 1.15 | 1.05 | 1.04 |  |

Example: Project the 2012 AADT at D053 on I-89 to Year 2015

2012 AADT = 29,300

$GF_3(2012 \rightarrow 2015) = 1.04$

2015 AADT =  $29,300 \times 1.04 = 30,472$

Round to the nearest hundred = 30,500

## 2015 AADT GROWTH FACTORS

The factors in the table below may be used to project current year AADTs to a future year. They are applicable on all routes statewide.

The factors are based on a 2015 to 2035 20-year AADT growth factor of 1.12 which was developed from Vermont economic and labor statistics.

| TO FUTURE<br>YEAR | FROM CURRENT YEAR |      |      |
|-------------------|-------------------|------|------|
|                   | 2015              | 2016 | 2017 |
| 2015              | 1.00              |      |      |
| 2016              | 1.01              | 1.00 |      |
| 2017              | 1.01              | 1.01 | 1.00 |
| 2018              | 1.02              | 1.01 | 1.01 |
| 2019              | 1.02              | 1.02 | 1.01 |
| 2020              | 1.03              | 1.02 | 1.02 |
| 2021              | 1.04              | 1.03 | 1.02 |
| 2022              | 1.04              | 1.04 | 1.03 |
| 2023              | 1.05              | 1.04 | 1.04 |
| 2024              | 1.05              | 1.05 | 1.04 |
| 2025              | 1.06              | 1.05 | 1.05 |
| 2026              | 1.07              | 1.06 | 1.05 |
| 2027              | 1.07              | 1.07 | 1.06 |
| 2028              | 1.08              | 1.07 | 1.07 |
| 2029              | 1.08              | 1.08 | 1.07 |
| 2030              | 1.09              | 1.08 | 1.08 |
| 2031              | 1.10              | 1.09 | 1.08 |
| 2032              | 1.10              | 1.10 | 1.09 |
| 2033              | 1.11              | 1.10 | 1.10 |
| 2034              | 1.11              | 1.11 | 1.10 |
| 2035              | 1.12              | 1.11 | 1.11 |
| 2036              | 1.13              | 1.12 | 1.11 |
| 2037              | 1.13              | 1.13 | 1.12 |
| 2038              | 1.14              | 1.13 | 1.13 |
| 2039              | 1.14              | 1.14 | 1.13 |
| 2040              | 1.15              | 1.14 | 1.14 |
| 2041              | 1.16              | 1.15 | 1.14 |
| 2042              | 1.16              | 1.16 | 1.15 |
| 2043              | 1.17              | 1.16 | 1.16 |
| 2044              | 1.17              | 1.17 | 1.16 |
| 2045              | 1.18              | 1.17 | 1.17 |





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## Trip Generation Calculations

FIGURE 5-A

Trip Generation - Burlington Town Center TIS

Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

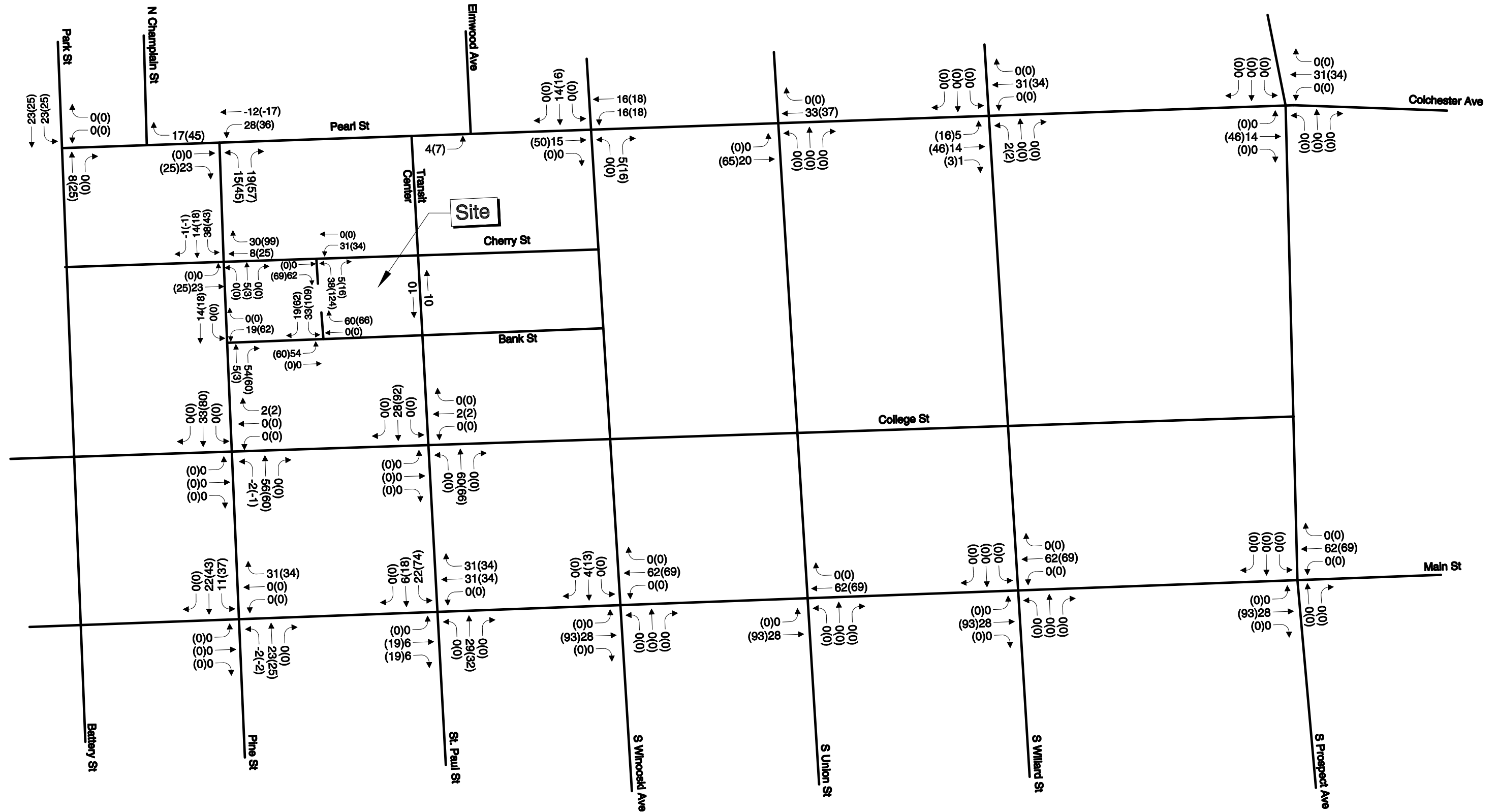
| Site Land Uses and Descriptions |                         |      |       | AM PK HR OF ADJACENT STREET TRAFFIC |        |           |          |          |              |                |               |               |             |          |         | PM PK HR OF ADJACENT STREET TRAFFIC |        |           |          |          |              |                |               |               |             |          |         |
|---------------------------------|-------------------------|------|-------|-------------------------------------|--------|-----------|----------|----------|--------------|----------------|---------------|---------------|-------------|----------|---------|-------------------------------------|--------|-----------|----------|----------|--------------|----------------|---------------|---------------|-------------|----------|---------|
| Code                            | Land Use                | Size | Unit  | directional dist.                   |        | average   |          |          |              | regression     |               | # trips       |             |          |         | directional dist.                   |        | average   |          |          |              | regression     |               | # trips       |             |          |         |
|                                 |                         |      |       | % enter                             | % exit | # studies | Avg Rate | Std Dev. | Total by Avg | r <sup>2</sup> | total by Eq'n | Method Chosen | Total Trips | Entering | Exiting | % enter                             | % exit | # studies | Avg Rate | Std Dev. | Total by Avg | r <sup>2</sup> | total by Eq'n | Method Chosen | Total Trips | Entering | Exiting |
| 1                               | 2                       | 3    | 4     | 16                                  | 17     | 18        | 19       | 20       | 21           | 22             | 23            | 24            | 25          |          |         | 26                                  | 27     | 28        | 29       | 30       | 31           | 32             | 33            | 34            | 35          |          |         |
| 223                             | Mid-Rise Apartment      | 192  | ea    | 31%                                 | 69%    | 7         | 0.30     | 0.56     | 58           | 0.83           | 65.66         | average       | 58          | 18       | 40      | 58%                                 | 42%    | 7         | 0.39     | 0.63     | 75           | 0.89           | 81            | average       | 75          | 43       | 31      |
| 565                             | Day Care Center         | 19.5 | 1k sf | 53%                                 | 47%    | 67        | 12.18    | 6.40     | 238          | n/a            | n/a           | average       | 238         | 126      | 112     | 47%                                 | 53%    | 68        | 12.38    | 6.93     | 241          | n/a            | n/a           | average       | 241         | 113      | 128     |
| 710                             | General Office Building | 230  | 1k sf | 88%                                 | 12%    | 218       | 1.56     | 1.40     | 359          | 0.83           | 373           | regression    | 373         | 328      | 45      | 17%                                 | 83%    | 236       | 1.49     | 1.37     | 343          | 0.82           | 336           | regression    | 336         | 57       | 279     |
| 820                             | Shopping Center         | 108  | 1k sf | 62%                                 | 38%    | 104       | 0.96     | 1.31     | 104          | 0.56           | 163           | average       | 104         | 64       | 39      | 48%                                 | 52%    | 426       | 3.71     | 2.74     | 401          | 0.81           | 631           | regression    | 631         | 303      | 328     |



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# Supporting Traffic Volume Networks





**Not to Scale**



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# Signalized Intersection Capacity Analysis

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                       | SBT                                                                               |
| Lane Configurations               |  |  |  |  |                           |  |
| Traffic Volume (vph)              | 162                                                                               | 81                                                                                | 309                                                                               | 182                                                                               | 307                       | 1331                                                                              |
| Future Volume (vph)               | 162                                                                               | 81                                                                                | 309                                                                               | 182                                                                               | 307                       | 1331                                                                              |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                      | 1900                                                                              |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                           | 4.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                           | 0.95                                                                              |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                           | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.99                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 3389                                                                              |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.80                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 2722                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                      | 1.00                                                                              |
| Adj. Flow (vph)                   | 162                                                                               | 81                                                                                | 309                                                                               | 182                                                                               | 307                       | 1331                                                                              |
| RTOR Reduction (vph)              | 0                                                                                 | 66                                                                                | 0                                                                                 | 53                                                                                | 0                         | 0                                                                                 |
| Lane Group Flow (vph)             | 162                                                                               | 15                                                                                | 309                                                                               | 129                                                                               | 0                         | 1638                                                                              |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                      | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                           | 6                                                                                 |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                         |                                                                                   |
| Actuated Green, G (s)             | 12.5                                                                              | 12.5                                                                              | 53.2                                                                              | 53.2                                                                              |                           | 53.2                                                                              |
| Effective Green, g (s)            | 14.5                                                                              | 14.5                                                                              | 55.2                                                                              | 55.2                                                                              |                           | 55.2                                                                              |
| Actuated g/C Ratio                | 0.19                                                                              | 0.19                                                                              | 0.71                                                                              | 0.71                                                                              |                           | 0.71                                                                              |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                           | 3.0                                                                               |
| Lane Grp Cap (vph)                | 319                                                                               | 285                                                                               | 1279                                                                              | 1913                                                                              |                           | 1933                                                                              |
| v/s Ratio Prot                    | c0.09                                                                             |                                                                                   | 0.17                                                                              |                                                                                   |                           |                                                                                   |
| v/s Ratio Perm                    |                                                                                   | 0.01                                                                              |                                                                                   | 0.05                                                                              |                           | c0.60                                                                             |
| v/c Ratio                         | 0.51                                                                              | 0.05                                                                              | 0.24                                                                              | 0.07                                                                              |                           | 0.85                                                                              |
| Uniform Delay, d1                 | 28.4                                                                              | 26.0                                                                              | 3.9                                                                               | 3.4                                                                               |                           | 8.2                                                                               |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 1.00                                                                              |
| Incremental Delay, d2             | 1.3                                                                               | 0.1                                                                               | 0.4                                                                               | 0.1                                                                               |                           | 4.8                                                                               |
| Delay (s)                         | 29.7                                                                              | 26.0                                                                              | 4.4                                                                               | 3.5                                                                               |                           | 13.0                                                                              |
| Level of Service                  | C                                                                                 | C                                                                                 | A                                                                                 | A                                                                                 |                           | B                                                                                 |
| Approach Delay (s)                | 28.5                                                                              |                                                                                   | 4.1                                                                               |                                                                                   |                           | 13.0                                                                              |
| Approach LOS                      | C                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                           | B                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 12.7                                                                              |                                                                                   | HCM 2000 Level of Service | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.78                                                                              |                                                                                   |                           |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 77.7                                                                              |                                                                                   | Sum of lost time (s)      | 8.0                                                                               |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 80.9%                                                                             |                                                                                   | ICU Level of Service      | D                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                           |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (vph)              | 372                                                                               | 40                                                                                | 91                                                                                | 333                                                                               | 19                                                                                | 23                                                                                |
| Future Volume (vph)               | 372                                                                               | 40                                                                                | 91                                                                                | 333                                                                               | 19                                                                                | 23                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Frt                               | 0.99                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.93                                                                              |                                                                                   |
| Flt Protected                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (prot)                 | 1777                                                                              |                                                                                   |                                                                                   | 1782                                                                              | 1631                                                                              |                                                                                   |
| Flt Permitted                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.75                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (perm)                 | 1777                                                                              |                                                                                   |                                                                                   | 1354                                                                              | 1631                                                                              |                                                                                   |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 372                                                                               | 40                                                                                | 91                                                                                | 333                                                                               | 19                                                                                | 23                                                                                |
| RTOR Reduction (vph)              | 8                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 13                                                                                | 0                                                                                 |
| Lane Group Flow (vph)             | 404                                                                               | 0                                                                                 | 0                                                                                 | 424                                                                               | 29                                                                                | 0                                                                                 |
| Turn Type                         | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Prot                                                                              |                                                                                   |
| Protected Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2                                                                                 |                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Actuated Green, G (s)             | 16.8                                                                              |                                                                                   |                                                                                   | 16.8                                                                              | 18.1                                                                              |                                                                                   |
| Effective Green, g (s)            | 18.8                                                                              |                                                                                   |                                                                                   | 18.8                                                                              | 20.1                                                                              |                                                                                   |
| Actuated g/C Ratio                | 0.40                                                                              |                                                                                   |                                                                                   | 0.40                                                                              | 0.43                                                                              |                                                                                   |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |
| Lane Grp Cap (vph)                | 712                                                                               |                                                                                   |                                                                                   | 542                                                                               | 699                                                                               |                                                                                   |
| v/s Ratio Prot                    | 0.23                                                                              |                                                                                   |                                                                                   |                                                                                   | c0.02                                                                             |                                                                                   |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | c0.31                                                                             |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.57                                                                              |                                                                                   |                                                                                   | 0.78                                                                              | 0.04                                                                              |                                                                                   |
| Uniform Delay, d1                 | 10.9                                                                              |                                                                                   |                                                                                   | 12.3                                                                              | 7.8                                                                               |                                                                                   |
| Progression Factor                | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Incremental Delay, d2             | 1.0                                                                               |                                                                                   |                                                                                   | 7.2                                                                               | 0.1                                                                               |                                                                                   |
| Delay (s)                         | 11.9                                                                              |                                                                                   |                                                                                   | 19.5                                                                              | 7.9                                                                               |                                                                                   |
| Level of Service                  | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 | A                                                                                 |                                                                                   |
| Approach Delay (s)                | 11.9                                                                              |                                                                                   |                                                                                   | 19.5                                                                              | 7.9                                                                               |                                                                                   |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 | A                                                                                 |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.4                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.40                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 46.9                                                                              |                                                                                   | Sum of lost time (s)                                                              | 8.0                                                                               |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 58.7%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |  |                                                                                     |  |  |  |  |
| Traffic Volume (vph)              | 0                                                                                 | 186                                                                               | 100                                                                               | 185                                                                               | 412                                                                               | 0                                                                                 | 126                                                                                 | 0                                                                                   | 103                                                                                 | 59                                                                                  | 362                                                                                 | 83                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 186                                                                               | 100                                                                               | 185                                                                               | 412                                                                               | 0                                                                                 | 126                                                                                 | 0                                                                                   | 103                                                                                 | 59                                                                                  | 362                                                                                 | 83                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                |                                                                                     | 0.85                                                                                | 1.00                                                                                | 0.97                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1801                                                                              | 1531                                                                              | 1711                                                                              | 1801                                                                              |                                                                                   | 1711                                                                                |                                                                                     | 1531                                                                                | 1711                                                                                | 3326                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.64                                                                              | 1.00                                                                              |                                                                                   | 0.49                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1801                                                                              | 1531                                                                              | 1153                                                                              | 1801                                                                              |                                                                                   | 890                                                                                 |                                                                                     | 1531                                                                                | 1711                                                                                | 3326                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 186                                                                               | 100                                                                               | 185                                                                               | 412                                                                               | 0                                                                                 | 126                                                                                 | 0                                                                                   | 103                                                                                 | 59                                                                                  | 362                                                                                 | 83                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 58                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 186                                                                               | 100                                                                               | 185                                                                               | 412                                                                               | 0                                                                                 | 126                                                                                 | 0                                                                                   | 45                                                                                  | 59                                                                                  | 445                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                |                                                                                     | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 15.7                                                                              | 15.7                                                                              | 15.7                                                                              | 15.7                                                                              |                                                                                   | 18.2                                                                                |                                                                                     | 18.2                                                                                | 18.2                                                                                | 18.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 17.7                                                                              | 17.7                                                                              | 17.7                                                                              | 17.7                                                                              |                                                                                   | 20.2                                                                                |                                                                                     | 20.2                                                                                | 20.2                                                                                | 20.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.39                                                                              | 0.39                                                                              | 0.39                                                                              | 0.39                                                                              |                                                                                   | 0.44                                                                                |                                                                                     | 0.44                                                                                | 0.44                                                                                | 0.44                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 694                                                                               | 590                                                                               | 444                                                                               | 694                                                                               |                                                                                   | 391                                                                                 |                                                                                     | 673                                                                                 | 752                                                                                 | 1463                                                                                |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.10                                                                              |                                                                                   |                                                                                   | c0.23                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.13                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.07                                                                              | 0.16                                                                              |                                                                                   |                                                                                   | c0.14                                                                               |                                                                                     | 0.03                                                                                | 0.03                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.27                                                                              | 0.17                                                                              | 0.42                                                                              | 0.59                                                                              |                                                                                   | 0.32                                                                                |                                                                                     | 0.07                                                                                | 0.08                                                                                | 0.30                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 9.7                                                                               | 9.3                                                                               | 10.3                                                                              | 11.2                                                                              |                                                                                   | 8.4                                                                                 |                                                                                     | 7.4                                                                                 | 7.5                                                                                 | 8.3                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 0.2                                                                               | 0.1                                                                               | 0.6                                                                               | 1.4                                                                               |                                                                                   | 2.2                                                                                 |                                                                                     | 0.2                                                                                 | 0.2                                                                                 | 0.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 9.9                                                                               | 9.4                                                                               | 11.0                                                                              | 12.6                                                                              |                                                                                   | 10.6                                                                                |                                                                                     | 7.6                                                                                 | 7.7                                                                                 | 8.8                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | A                                                                                 | A                                                                                 | B                                                                                 | B                                                                                 |                                                                                   | B                                                                                   |                                                                                     | A                                                                                   | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 9.7                                                                               |                                                                                   |                                                                                   | 12.1                                                                              |                                                                                   |                                                                                     | 9.2                                                                                 |                                                                                     |                                                                                     | 8.7                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 10.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.47                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 45.9                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 53.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 54                                                                                | 323                                                                               | 0                                                                                 | 0                                                                                 | 497                                                                               | 67                                                                                | 30                                                                                  | 105                                                                                 | 51                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 54                                                                                | 323                                                                               | 0                                                                                 | 0                                                                                 | 497                                                                               | 67                                                                                | 30                                                                                  | 105                                                                                 | 51                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               |                                                                                   | 4.0                                                                                 | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                                | 0.95                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1772                                                                              |                                                                                   | 1711                                                                                | 1712                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.27                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 485                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1772                                                                              |                                                                                   | 1711                                                                                | 1712                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 54                                                                                | 323                                                                               | 0                                                                                 | 0                                                                                 | 497                                                                               | 67                                                                                | 30                                                                                  | 105                                                                                 | 51                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                   | 30                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 54                                                                                | 323                                                                               | 0                                                                                 | 0                                                                                 | 554                                                                               | 0                                                                                 | 30                                                                                  | 126                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 19.9                                                                              | 19.9                                                                              |                                                                                   |                                                                                   | 19.9                                                                              |                                                                                   | 18.2                                                                                | 18.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 21.9                                                                              | 21.9                                                                              |                                                                                   |                                                                                   | 21.9                                                                              |                                                                                   | 20.2                                                                                | 20.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.44                                                                              | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   | 0.40                                                                                | 0.40                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 212                                                                               | 787                                                                               |                                                                                   |                                                                                   | 774                                                                               |                                                                                   | 689                                                                                 | 690                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.18                                                                              |                                                                                   |                                                                                   | c0.31                                                                             |                                                                                   |                                                                                     | c0.07                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.11                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.25                                                                              | 0.41                                                                              |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   | 0.04                                                                                | 0.18                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 8.9                                                                               | 9.7                                                                               |                                                                                   |                                                                                   | 11.6                                                                              |                                                                                   | 9.1                                                                                 | 9.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 0.3                                                                               |                                                                                   |                                                                                   | 3.2                                                                               |                                                                                   | 0.1                                                                                 | 0.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 9.6                                                                               | 10.0                                                                              |                                                                                   |                                                                                   | 14.7                                                                              |                                                                                   | 9.2                                                                                 | 10.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   | A                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 10.0                                                                              |                                                                                   |                                                                                   | 14.7                                                                              |                                                                                   |                                                                                     | 10.1                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 12.4                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 50.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                     | 8.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 53.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 14                                                                                | 337                                                                               | 46                                                                                | 49                                                                                | 488                                                                               | 17                                                                                | 32                                                                                 | 107                                                                                 | 50                                                                                  | 25                                                                                  | 240                                                                                 | 34                                                                                  |
| Future Volume (vph)               | 14                                                                                | 337                                                                               | 46                                                                                | 49                                                                                | 488                                                                               | 17                                                                                | 32                                                                                 | 107                                                                                 | 50                                                                                  | 25                                                                                  | 240                                                                                 | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 4.0                                                                                 |                                                                                     |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1769                                                                              |                                                                                   | 1711                                                                              | 1792                                                                              |                                                                                   |                                                                                    | 1722                                                                                |                                                                                     |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.98                                                                              |                                                                                   | 0.52                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.92                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1734                                                                              |                                                                                   | 944                                                                               | 1792                                                                              |                                                                                   |                                                                                    | 1598                                                                                |                                                                                     |                                                                                     | 1706                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 14                                                                                | 337                                                                               | 46                                                                                | 49                                                                                | 488                                                                               | 17                                                                                | 32                                                                                 | 107                                                                                 | 50                                                                                  | 25                                                                                  | 240                                                                                 | 34                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 29                                                                                  | 0                                                                                   | 0                                                                                   | 10                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 388                                                                               | 0                                                                                 | 49                                                                                | 503                                                                               | 0                                                                                 | 0                                                                                  | 160                                                                                 | 0                                                                                   | 0                                                                                   | 289                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.3                                                                              |                                                                                   | 20.3                                                                              | 20.3                                                                              |                                                                                   |                                                                                    | 12.4                                                                                |                                                                                     |                                                                                     | 12.4                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 22.3                                                                              |                                                                                   | 22.3                                                                              | 22.3                                                                              |                                                                                   |                                                                                    | 14.4                                                                                |                                                                                     |                                                                                     | 14.4                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.50                                                                              |                                                                                   | 0.50                                                                              | 0.50                                                                              |                                                                                   |                                                                                    | 0.32                                                                                |                                                                                     |                                                                                     | 0.32                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 865                                                                               |                                                                                   | 470                                                                               | 893                                                                               |                                                                                   |                                                                                    | 514                                                                                 |                                                                                     |                                                                                     | 549                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | c0.28                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.22                                                                              |                                                                                   | 0.05                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.10                                                                                |                                                                                     |                                                                                     | c0.17                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.45                                                                              |                                                                                   | 0.10                                                                              | 0.56                                                                              |                                                                                   |                                                                                    | 0.31                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 7.2                                                                               |                                                                                   | 5.9                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 11.4                                                                                |                                                                                     |                                                                                     | 12.4                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.7                                                                               |                                                                                   | 0.4                                                                               | 2.6                                                                               |                                                                                   |                                                                                    | 0.3                                                                                 |                                                                                     |                                                                                     | 0.9                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 8.9                                                                               |                                                                                   | 6.4                                                                               | 10.4                                                                              |                                                                                   |                                                                                    | 11.8                                                                                |                                                                                     |                                                                                     | 13.3                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | A                                                                                 |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 8.9                                                                               |                                                                                   |                                                                                   | 10.0                                                                              |                                                                                   |                                                                                    | 11.8                                                                                |                                                                                     |                                                                                     | 13.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 10.6                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 44.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 8.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 57.1%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |  |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 387                                                                               | 75                                                                                | 197                                                                               | 523                                                                               | 45                                                                                | 76                                                                                  | 74                                                                                  | 121                                                                                 | 38                                                                                  | 224                                                                                 | 27                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 387                                                                               | 75                                                                                | 197                                                                               | 523                                                                               | 45                                                                                | 76                                                                                  | 74                                                                                  | 121                                                                                 | 38                                                                                  | 224                                                                                 | 27                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1761                                                                              |                                                                                   | 1711                                                                              | 1779                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.25                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1761                                                                              |                                                                                   | 451                                                                               | 1779                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1766                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 387                                                                               | 75                                                                                | 197                                                                               | 523                                                                               | 45                                                                                | 76                                                                                  | 74                                                                                  | 121                                                                                 | 38                                                                                  | 224                                                                                 | 27                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 105                                                                                 | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 454                                                                               | 0                                                                                 | 197                                                                               | 568                                                                               | 0                                                                                 | 76                                                                                  | 74                                                                                  | 16                                                                                  | 0                                                                                   | 284                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     | Split                                                                               | NA                                                                                  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.5                                                                              |                                                                                   | 31.7                                                                              | 31.7                                                                              |                                                                                   | 7.3                                                                                 | 7.3                                                                                 | 7.3                                                                                 |                                                                                     | 15.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 22.5                                                                              |                                                                                   | 33.7                                                                              | 33.7                                                                              |                                                                                   | 9.3                                                                                 | 9.3                                                                                 | 9.3                                                                                 |                                                                                     | 17.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.31                                                                              |                                                                                   | 0.47                                                                              | 0.47                                                                              |                                                                                   | 0.13                                                                                | 0.13                                                                                | 0.13                                                                                |                                                                                     | 0.24                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 548                                                                               |                                                                                   | 336                                                                               | 830                                                                               |                                                                                   | 220                                                                                 | 231                                                                                 | 197                                                                                 |                                                                                     | 420                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.26                                                                             |                                                                                   | 0.06                                                                              | c0.32                                                                             |                                                                                   | c0.04                                                                               | 0.04                                                                                |                                                                                     |                                                                                     | c0.16                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.83                                                                              |                                                                                   | 0.59                                                                              | 0.68                                                                              |                                                                                   | 0.35                                                                                | 0.32                                                                                | 0.08                                                                                |                                                                                     | 0.68                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 23.1                                                                              |                                                                                   | 23.4                                                                              | 15.1                                                                              |                                                                                   | 28.7                                                                                | 28.6                                                                                | 27.7                                                                                |                                                                                     | 25.0                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 13.6                                                                              |                                                                                   | 2.6                                                                               | 4.6                                                                               |                                                                                   | 0.9                                                                                 | 0.8                                                                                 | 0.2                                                                                 |                                                                                     | 4.3                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 36.6                                                                              |                                                                                   | 26.0                                                                              | 19.6                                                                              |                                                                                   | 29.6                                                                                | 29.4                                                                                | 27.9                                                                                |                                                                                     | 29.3                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   | C                                                                                   | C                                                                                   | C                                                                                   |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 36.6                                                                              |                                                                                   |                                                                                   | 21.3                                                                              |                                                                                   |                                                                                     | 28.8                                                                                |                                                                                     |                                                                                     | 29.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 72.2                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 87.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 10                                                                                | 407                                                                               | 82                                                                                | 81                                                                                | 428                                                                               | 94                                                                                | 56                                                                                 | 120                                                                                 | 56                                                                                  | 35                                                                                  | 60                                                                                  | 14                                                                                  |
| Future Volume (vph)               | 10                                                                                | 407                                                                               | 82                                                                                | 81                                                                                | 428                                                                               | 94                                                                                | 56                                                                                 | 120                                                                                 | 56                                                                                  | 35                                                                                  | 60                                                                                  | 14                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               |                                                                                   |                                                                                    | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1759                                                                              |                                                                                   |                                                                                   | 1751                                                                              |                                                                                   |                                                                                    | 1772                                                                                | 1531                                                                                |                                                                                     | 1741                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                    | 0.88                                                                                | 1.00                                                                                |                                                                                     | 0.88                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1737                                                                              |                                                                                   |                                                                                   | 1572                                                                              |                                                                                   |                                                                                    | 1593                                                                                | 1531                                                                                |                                                                                     | 1556                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 10                                                                                | 407                                                                               | 82                                                                                | 81                                                                                | 428                                                                               | 94                                                                                | 56                                                                                 | 120                                                                                 | 56                                                                                  | 35                                                                                  | 60                                                                                  | 14                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 35                                                                                  | 0                                                                                   | 8                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 486                                                                               | 0                                                                                 | 0                                                                                 | 591                                                                               | 0                                                                                 | 0                                                                                  | 176                                                                                 | 21                                                                                  | 0                                                                                   | 101                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                |                                                                                     | 18.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 26.2                                                                              |                                                                                   |                                                                                   | 26.2                                                                              |                                                                                   |                                                                                    | 20.2                                                                                | 20.2                                                                                |                                                                                     | 20.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.48                                                                              |                                                                                   |                                                                                   | 0.48                                                                              |                                                                                   |                                                                                    | 0.37                                                                                | 0.37                                                                                |                                                                                     | 0.37                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 836                                                                               |                                                                                   |                                                                                   | 757                                                                               |                                                                                   |                                                                                    | 591                                                                                 | 568                                                                                 |                                                                                     | 577                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                    | 0.11                                                                                | 0.01                                                                                |                                                                                     | 0.06                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.58                                                                              |                                                                                   |                                                                                   | 0.78                                                                              |                                                                                   |                                                                                    | 0.30                                                                                | 0.04                                                                                |                                                                                     | 0.17                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 10.2                                                                              |                                                                                   |                                                                                   | 11.7                                                                              |                                                                                   |                                                                                    | 12.1                                                                                | 10.9                                                                                |                                                                                     | 11.5                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.0                                                                               |                                                                                   |                                                                                   | 5.2                                                                               |                                                                                   |                                                                                    | 1.3                                                                                 | 0.1                                                                                 |                                                                                     | 0.7                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 16.9                                                                              |                                                                                   |                                                                                    | 13.4                                                                                | 11.0                                                                                |                                                                                     | 12.2                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 16.9                                                                              |                                                                                   |                                                                                    | 12.8                                                                                |                                                                                     |                                                                                     | 12.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 13.9                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.57                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 54.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 8.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 82.3%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 3                                                                                 | 316                                                                               | 69                                                                                | 59                                                                                | 442                                                                               | 71                                                                                | 100                                                                                | 126                                                                                 | 40                                                                                  | 22                                                                                  | 31                                                                                  | 13                                                                                  |
| Future Volume (vph)               | 3                                                                                 | 316                                                                               | 69                                                                                | 59                                                                                | 442                                                                               | 71                                                                                | 100                                                                                | 126                                                                                 | 40                                                                                  | 22                                                                                  | 31                                                                                  | 13                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 |                                                                                   | 1800                                                                              | 1531                                                                              | 1711                                                                              | 1763                                                                              |                                                                                   |                                                                                    | 1762                                                                                | 1531                                                                                |                                                                                     | 1764                                                                                | 1531                                                                                |
| Flt Permitted                     |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.51                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.85                                                                                | 1.00                                                                                |                                                                                     | 0.86                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 |                                                                                   | 1792                                                                              | 1531                                                                              | 911                                                                               | 1763                                                                              |                                                                                   |                                                                                    | 1537                                                                                | 1531                                                                                |                                                                                     | 1549                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 3                                                                                 | 316                                                                               | 69                                                                                | 59                                                                                | 442                                                                               | 71                                                                                | 100                                                                                | 126                                                                                 | 40                                                                                  | 22                                                                                  | 31                                                                                  | 13                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 41                                                                                | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 23                                                                                  | 0                                                                                   | 0                                                                                   | 7                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 319                                                                               | 28                                                                                | 59                                                                                | 500                                                                               | 0                                                                                 | 0                                                                                  | 226                                                                                 | 17                                                                                  | 0                                                                                   | 53                                                                                  | 6                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             |                                                                                   | 17.0                                                                              | 17.0                                                                              | 17.0                                                                              | 17.0                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                |
| Effective Green, g (s)            |                                                                                   | 19.0                                                                              | 19.0                                                                              | 19.0                                                                              | 19.0                                                                              |                                                                                   |                                                                                    | 20.1                                                                                | 20.1                                                                                |                                                                                     | 20.1                                                                                | 20.1                                                                                |
| Actuated g/C Ratio                |                                                                                   | 0.40                                                                              | 0.40                                                                              | 0.40                                                                              | 0.40                                                                              |                                                                                   |                                                                                    | 0.43                                                                                | 0.43                                                                                |                                                                                     | 0.43                                                                                | 0.43                                                                                |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                |                                                                                   | 722                                                                               | 617                                                                               | 367                                                                               | 711                                                                               |                                                                                   |                                                                                    | 655                                                                                 | 653                                                                                 |                                                                                     | 661                                                                                 | 653                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.28                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.18                                                                              | 0.02                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.15                                                                               | 0.01                                                                                |                                                                                     | 0.03                                                                                | 0.00                                                                                |
| v/c Ratio                         |                                                                                   | 0.44                                                                              | 0.05                                                                              | 0.16                                                                              | 0.70                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.03                                                                                |                                                                                     | 0.08                                                                                | 0.01                                                                                |
| Uniform Delay, d1                 |                                                                                   | 10.2                                                                              | 8.5                                                                               | 9.0                                                                               | 11.7                                                                              |                                                                                   |                                                                                    | 9.1                                                                                 | 7.8                                                                                 |                                                                                     | 8.0                                                                                 | 7.8                                                                                 |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             |                                                                                   | 0.4                                                                               | 0.0                                                                               | 0.2                                                                               | 3.2                                                                               |                                                                                   |                                                                                    | 1.4                                                                                 | 0.1                                                                                 |                                                                                     | 0.2                                                                                 | 0.0                                                                                 |
| Delay (s)                         |                                                                                   | 10.6                                                                              | 8.6                                                                               | 9.2                                                                               | 14.9                                                                              |                                                                                   |                                                                                    | 10.5                                                                                | 7.9                                                                                 |                                                                                     | 8.3                                                                                 | 7.8                                                                                 |
| Level of Service                  |                                                                                   | B                                                                                 | A                                                                                 | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 10.3                                                                              |                                                                                   |                                                                                   | 14.3                                                                              |                                                                                   |                                                                                    | 10.1                                                                                |                                                                                     |                                                                                     | 8.2                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 11.9                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.52                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 47.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     |                                                                                     | 8.0                                                                                 |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 74.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 41                                                                                | 300                                                                               | 18                                                                                | 113                                                                               | 457                                                                               | 141                                                                               | 6                                                                                  | 53                                                                                  | 11                                                                                  | 95                                                                                  | 248                                                                                 | 119                                                                                 |
| Future Volume (vph)               | 41                                                                                | 300                                                                               | 18                                                                                | 113                                                                               | 457                                                                               | 141                                                                               | 6                                                                                  | 53                                                                                  | 11                                                                                  | 95                                                                                  | 248                                                                                 | 119                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                    | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1711                                                                              | 1785                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1755                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.35                                                                              | 1.00                                                                              |                                                                                   | 0.50                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.97                                                                                |                                                                                     | 0.71                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 628                                                                               | 1785                                                                              |                                                                                   | 909                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1714                                                                                |                                                                                     | 1281                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 41                                                                                | 300                                                                               | 18                                                                                | 113                                                                               | 457                                                                               | 141                                                                               | 6                                                                                  | 53                                                                                  | 11                                                                                  | 95                                                                                  | 248                                                                                 | 119                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 85                                                                                | 0                                                                                  | 6                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 68                                                                                  |
| Lane Group Flow (vph)             | 41                                                                                | 313                                                                               | 0                                                                                 | 113                                                                               | 457                                                                               | 56                                                                                | 0                                                                                  | 64                                                                                  | 0                                                                                   | 95                                                                                  | 248                                                                                 | 51                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 16.4                                                                              | 16.4                                                                              |                                                                                   | 16.4                                                                              | 16.4                                                                              | 16.4                                                                              |                                                                                    | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |
| Effective Green, g (s)            | 18.4                                                                              | 18.4                                                                              |                                                                                   | 18.4                                                                              | 18.4                                                                              | 18.4                                                                              |                                                                                    | 20.1                                                                                |                                                                                     | 20.1                                                                                | 20.1                                                                                | 20.1                                                                                |
| Actuated g/C Ratio                | 0.40                                                                              | 0.40                                                                              |                                                                                   | 0.40                                                                              | 0.40                                                                              | 0.40                                                                              |                                                                                    | 0.43                                                                                |                                                                                     | 0.43                                                                                | 0.43                                                                                | 0.43                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 248                                                                               | 706                                                                               |                                                                                   | 359                                                                               | 712                                                                               | 605                                                                               |                                                                                    | 740                                                                                 |                                                                                     | 553                                                                                 | 778                                                                                 | 661                                                                                 |
| v/s Ratio Prot                    |                                                                                   | 0.18                                                                              |                                                                                   |                                                                                   | c0.25                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.14                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.07                                                                              |                                                                                   |                                                                                   | 0.12                                                                              |                                                                                   | 0.04                                                                              |                                                                                    | 0.04                                                                                |                                                                                     | 0.07                                                                                |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.17                                                                              | 0.44                                                                              |                                                                                   | 0.31                                                                              | 0.64                                                                              | 0.09                                                                              |                                                                                    | 0.09                                                                                |                                                                                     | 0.17                                                                                | 0.32                                                                                | 0.08                                                                                |
| Uniform Delay, d1                 | 9.1                                                                               | 10.3                                                                              |                                                                                   | 9.7                                                                               | 11.4                                                                              | 8.8                                                                               |                                                                                    | 7.8                                                                                 |                                                                                     | 8.1                                                                                 | 8.7                                                                                 | 7.8                                                                                 |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 0.3                                                                               | 0.4                                                                               |                                                                                   | 0.5                                                                               | 2.0                                                                               | 0.1                                                                               |                                                                                    | 0.2                                                                                 |                                                                                     | 0.7                                                                                 | 1.1                                                                                 | 0.2                                                                                 |
| Delay (s)                         | 9.4                                                                               | 10.7                                                                              |                                                                                   | 10.2                                                                              | 13.4                                                                              | 8.9                                                                               |                                                                                    | 8.0                                                                                 |                                                                                     | 8.8                                                                                 | 9.8                                                                                 | 8.0                                                                                 |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | B                                                                                 | A                                                                                 |                                                                                    | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 10.6                                                                              |                                                                                   |                                                                                   | 12.0                                                                              |                                                                                   |                                                                                    | 8.0                                                                                 |                                                                                     |                                                                                     | 9.1                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 10.7                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.47                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 46.5                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 8.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 51.3%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 14                                                                                | 419                                                                               | 0                                                                                 | 0                                                                                 | 707                                                                               | 32                                                                                | 41                                                                                 | 542                                                                                 | 46                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 14                                                                                | 419                                                                               | 0                                                                                 | 0                                                                                 | 707                                                                               | 32                                                                                | 41                                                                                 | 542                                                                                 | 46                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               |                                                                                   |                                                                                    | 4.0                                                                                 | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1790                                                                              |                                                                                   |                                                                                    | 1794                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.12                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 219                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1790                                                                              |                                                                                   |                                                                                    | 1794                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 14                                                                                | 419                                                                               | 0                                                                                 | 0                                                                                 | 707                                                                               | 32                                                                                | 41                                                                                 | 542                                                                                 | 46                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 25                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 14                                                                                | 419                                                                               | 0                                                                                 | 0                                                                                 | 737                                                                               | 0                                                                                 | 0                                                                                  | 583                                                                                 | 21                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 32.0                                                                              | 32.0                                                                              |                                                                                   |                                                                                   | 32.0                                                                              |                                                                                   |                                                                                    | 29.1                                                                                | 29.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 34.0                                                                              | 34.0                                                                              |                                                                                   |                                                                                   | 34.0                                                                              |                                                                                   |                                                                                    | 31.1                                                                                | 31.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.47                                                                              | 0.47                                                                              |                                                                                   |                                                                                   | 0.47                                                                              |                                                                                   |                                                                                    | 0.43                                                                                | 0.43                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 101                                                                               | 837                                                                               |                                                                                   |                                                                                   | 832                                                                               |                                                                                   |                                                                                    | 763                                                                                 | 651                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.23                                                                              |                                                                                   |                                                                                   | c0.41                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.32                                                                                | 0.01                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.14                                                                              | 0.50                                                                              |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                    | 0.76                                                                                | 0.03                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 11.2                                                                              | 13.6                                                                              |                                                                                   |                                                                                   | 17.8                                                                              |                                                                                   |                                                                                    | 17.9                                                                                | 12.2                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 0.5                                                                               |                                                                                   |                                                                                   | 11.1                                                                              |                                                                                   |                                                                                    | 7.2                                                                                 | 0.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 11.8                                                                              | 14.1                                                                              |                                                                                   |                                                                                   | 28.9                                                                              |                                                                                   |                                                                                    | 25.0                                                                                | 12.3                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 14.0                                                                              |                                                                                   |                                                                                   | 28.9                                                                              |                                                                                   |                                                                                    | 24.1                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 23.7                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.83                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 73.1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 76.6%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 15                                                                                | 413                                                                               | 14                                                                                | 56                                                                                | 590                                                                               | 32                                                                                | 21                                                                                 | 194                                                                                 | 47                                                                                  | 66                                                                                  | 203                                                                                 | 19                                                                                  |
| Future Volume (vph)               | 15                                                                                | 413                                                                               | 14                                                                                | 56                                                                                | 590                                                                               | 32                                                                                | 21                                                                                 | 194                                                                                 | 47                                                                                  | 66                                                                                  | 203                                                                                 | 19                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 4.0                                                                                 |                                                                                     |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1792                                                                              |                                                                                   | 1711                                                                              | 1787                                                                              |                                                                                   |                                                                                    | 1750                                                                                |                                                                                     |                                                                                     | 1764                                                                                |                                                                                     |
| Flt Permitted                     | 0.23                                                                              | 1.00                                                                              |                                                                                   | 0.41                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.88                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 413                                                                               | 1792                                                                              |                                                                                   | 737                                                                               | 1787                                                                              |                                                                                   |                                                                                    | 1689                                                                                |                                                                                     |                                                                                     | 1562                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 15                                                                                | 413                                                                               | 14                                                                                | 56                                                                                | 590                                                                               | 32                                                                                | 21                                                                                 | 194                                                                                 | 47                                                                                  | 66                                                                                  | 203                                                                                 | 19                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  | 13                                                                                  | 0                                                                                   | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 15                                                                                | 425                                                                               | 0                                                                                 | 56                                                                                | 618                                                                               | 0                                                                                 | 0                                                                                  | 249                                                                                 | 0                                                                                   | 0                                                                                   | 284                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 21.3                                                                              | 21.3                                                                              |                                                                                   | 21.3                                                                              | 21.3                                                                              |                                                                                   |                                                                                    | 18.1                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 23.3                                                                              | 23.3                                                                              |                                                                                   | 23.3                                                                              | 23.3                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.45                                                                              | 0.45                                                                              |                                                                                   | 0.45                                                                              | 0.45                                                                              |                                                                                   |                                                                                    | 0.39                                                                                |                                                                                     |                                                                                     | 0.39                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 187                                                                               | 812                                                                               |                                                                                   | 334                                                                               | 810                                                                               |                                                                                   |                                                                                    | 660                                                                                 |                                                                                     |                                                                                     | 610                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.24                                                                              |                                                                                   |                                                                                   | c0.35                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.04                                                                              |                                                                                   |                                                                                   | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.15                                                                                |                                                                                     |                                                                                     | c0.18                                                                               |                                                                                     |
| v/c Ratio                         | 0.08                                                                              | 0.52                                                                              |                                                                                   | 0.17                                                                              | 0.76                                                                              |                                                                                   |                                                                                    | 0.38                                                                                |                                                                                     |                                                                                     | 0.47                                                                                |                                                                                     |
| Uniform Delay, d1                 | 8.0                                                                               | 10.1                                                                              |                                                                                   | 8.3                                                                               | 11.7                                                                              |                                                                                   |                                                                                    | 11.2                                                                                |                                                                                     |                                                                                     | 11.6                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.2                                                                               | 0.6                                                                               |                                                                                   | 0.2                                                                               | 4.3                                                                               |                                                                                   |                                                                                    | 1.6                                                                                 |                                                                                     |                                                                                     | 2.5                                                                                 |                                                                                     |
| Delay (s)                         | 8.2                                                                               | 10.7                                                                              |                                                                                   | 8.6                                                                               | 16.0                                                                              |                                                                                   |                                                                                    | 12.8                                                                                |                                                                                     |                                                                                     | 14.2                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 10.6                                                                              |                                                                                   |                                                                                   | 15.4                                                                              |                                                                                   |                                                                                    | 12.8                                                                                |                                                                                     |                                                                                     | 14.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.5                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.62                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 51.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 8.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 78.7%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT   | WBR  | NBL                       | NBT   | NBR  | SBL   | SBT  | SBR  |
|-----------------------------------|------|------|-------|------|-------|------|---------------------------|-------|------|-------|------|------|
| Lane Configurations               |      | ↑↑   |       | ↑    | ↑     | ↑    |                           | ↑     | ↑    | ↑↑    | ↑    |      |
| Traffic Volume (vph)              | 0    | 664  | 4     | 224  | 910   | 609  | 0                         | 85    | 179  | 240   | 73   | 46   |
| Future Volume (vph)               | 0    | 664  | 4     | 224  | 910   | 609  | 0                         | 85    | 179  | 240   | 73   | 46   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900 | 1900  | 1900 | 1900                      | 1900  | 1900 | 1900  | 1900 | 1900 |
| Total Lost time (s)               |      | 4.0  |       | 4.0  | 4.0   | 4.0  |                           | 4.0   | 4.0  | 4.0   | 4.0  |      |
| Lane Util. Factor                 |      | 0.95 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.97  | 1.00 |      |
| Frt                               |      | 1.00 |       | 1.00 | 1.00  | 0.85 |                           | 1.00  | 0.85 | 1.00  | 0.94 |      |
| Flt Protected                     |      | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (prot)                 |      | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1696 |      |
| Flt Permitted                     |      | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (perm)                 |      | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1696 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00 | 1.00  | 1.00 | 1.00                      | 1.00  | 1.00 | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 664  | 4     | 224  | 910   | 609  | 0                         | 85    | 179  | 240   | 73   | 46   |
| RTOR Reduction (vph)              | 0    | 1    | 0     | 0    | 0     | 0    | 0                         | 0     | 154  | 0     | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 667  | 0     | 224  | 910   | 609  | 0                         | 85    | 25   | 240   | 119  | 0    |
| Turn Type                         |      | NA   |       | Prot | NA    | Prot |                           | NA    | Perm | Prot  | NA   |      |
| Protected Phases                  |      | 4    |       | 3    | 8     | 8    |                           | 2     |      | 1     | 6    |      |
| Permitted Phases                  |      |      |       |      |       |      |                           |       | 2    |       |      |      |
| Actuated Green, G (s)             |      | 27.3 |       | 14.8 | 48.1  | 48.1 |                           | 9.3   | 9.3  | 5.0   | 20.3 |      |
| Effective Green, g (s)            |      | 29.3 |       | 16.8 | 50.1  | 50.1 |                           | 11.3  | 11.3 | 7.0   | 22.3 |      |
| Actuated g/C Ratio                |      | 0.36 |       | 0.21 | 0.62  | 0.62 |                           | 0.14  | 0.14 | 0.09  | 0.28 |      |
| Clearance Time (s)                |      | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  |       | 3.0  | 3.0   | 3.0  |                           | 3.0   | 3.0  | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)                |      | 1245 |       | 357  | 1122  | 954  |                           | 253   | 215  | 288   | 470  |      |
| v/s Ratio Prot                    |      | 0.20 |       | 0.13 | c0.51 | 0.40 |                           | c0.05 |      | c0.07 | 0.07 |      |
| v/s Ratio Perm                    |      |      |       |      |       |      |                           |       | 0.02 |       |      |      |
| v/c Ratio                         |      | 0.54 |       | 0.63 | 0.81  | 0.64 |                           | 0.34  | 0.12 | 0.83  | 0.25 |      |
| Uniform Delay, d1                 |      | 20.2 |       | 29.0 | 11.5  | 9.5  |                           | 31.2  | 30.2 | 36.1  | 22.6 |      |
| Progression Factor                |      | 1.00 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 1.00  | 1.00 |      |
| Incremental Delay, d2             |      | 1.7  |       | 3.4  | 6.4   | 3.3  |                           | 0.8   | 0.2  | 18.3  | 0.3  |      |
| Delay (s)                         |      | 21.8 |       | 32.4 | 17.9  | 12.7 |                           | 32.0  | 30.4 | 54.4  | 22.9 |      |
| Level of Service                  |      | C    |       | C    | B     | B    |                           | C     | C    | D     | C    |      |
| Approach Delay (s)                |      | 21.8 |       |      | 18.0  |      |                           | 30.9  |      |       | 44.0 |      |
| Approach LOS                      |      | C    |       |      | B     |      |                           | C     |      |       | D    |      |
| <b>Intersection Summary</b>       |      |      |       |      |       |      |                           |       |      |       |      |      |
| HCM 2000 Control Delay            |      |      | 23.0  |      |       |      | HCM 2000 Level of Service |       |      | C     |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.78  |      |       |      |                           |       |      |       |      |      |
| Actuated Cycle Length (s)         |      |      | 80.4  |      |       |      | Sum of lost time (s)      |       |      | 16.0  |      |      |
| Intersection Capacity Utilization |      |      | 68.1% |      |       |      | ICU Level of Service      |       |      | C     |      |      |
| Analysis Period (min)             |      |      | 15    |      |       |      |                           |       |      |       |      |      |
| c Critical Lane Group             |      |      |       |      |       |      |                           |       |      |       |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |  |  |  |                                                                                   |  |
| Traffic Volume (vph)              | 151                                                                               | 166                                                                               | 810                                                                               | 486                                                                               | 149                                                                               | 599                                                                               |
| Future Volume (vph)               | 151                                                                               | 166                                                                               | 810                                                                               | 486                                                                               | 149                                                                               | 599                                                                               |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                                                                                   | 0.95                                                                              |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                                                                                   | 3388                                                                              |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.59                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                                                                                   | 2007                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 151                                                                               | 166                                                                               | 810                                                                               | 486                                                                               | 149                                                                               | 599                                                                               |
| RTOR Reduction (vph)              | 0                                                                                 | 104                                                                               | 0                                                                                 | 196                                                                               | 0                                                                                 | 0                                                                                 |
| Lane Group Flow (vph)             | 151                                                                               | 62                                                                                | 810                                                                               | 290                                                                               | 0                                                                                 | 748                                                                               |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |
| Actuated Green, G (s)             | 10.1                                                                              | 10.1                                                                              | 32.8                                                                              | 32.8                                                                              |                                                                                   | 32.8                                                                              |
| Effective Green, g (s)            | 10.1                                                                              | 10.1                                                                              | 32.8                                                                              | 32.8                                                                              |                                                                                   | 32.8                                                                              |
| Actuated g/C Ratio                | 0.18                                                                              | 0.18                                                                              | 0.60                                                                              | 0.60                                                                              |                                                                                   | 0.60                                                                              |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |
| Lane Grp Cap (vph)                | 314                                                                               | 281                                                                               | 1076                                                                              | 1609                                                                              |                                                                                   | 1199                                                                              |
| v/s Ratio Prot                    | c0.09                                                                             |                                                                                   | c0.45                                                                             |                                                                                   |                                                                                   |                                                                                   |
| v/s Ratio Perm                    |                                                                                   | 0.04                                                                              |                                                                                   | 0.11                                                                              |                                                                                   | 0.37                                                                              |
| v/c Ratio                         | 0.48                                                                              | 0.22                                                                              | 0.75                                                                              | 0.18                                                                              |                                                                                   | 0.62                                                                              |
| Uniform Delay, d1                 | 20.1                                                                              | 19.0                                                                              | 8.1                                                                               | 5.0                                                                               |                                                                                   | 7.1                                                                               |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |
| Incremental Delay, d2             | 1.2                                                                               | 0.4                                                                               | 4.9                                                                               | 0.2                                                                               |                                                                                   | 2.5                                                                               |
| Delay (s)                         | 21.2                                                                              | 19.4                                                                              | 13.0                                                                              | 5.2                                                                               |                                                                                   | 9.5                                                                               |
| Level of Service                  | C                                                                                 | B                                                                                 | B                                                                                 | A                                                                                 |                                                                                   | A                                                                                 |
| Approach Delay (s)                | 20.3                                                                              |                                                                                   | 10.1                                                                              |                                                                                   |                                                                                   | 9.5                                                                               |
| Approach LOS                      | C                                                                                 |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | A                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 11.3                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.69                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 54.9                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 86.9%                                                                             |                                                                                   | ICU Level of Service                                                              | E                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (vph)              | 422                                                                               | 17                                                                                | 38                                                                                | 462                                                                               | 45                                                                                | 98                                                                                |
| Future Volume (vph)               | 422                                                                               | 17                                                                                | 38                                                                                | 462                                                                               | 45                                                                                | 98                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Frt                               | 0.99                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.91                                                                              |                                                                                   |
| Flt Protected                     | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (prot)                 | 1791                                                                              |                                                                                   |                                                                                   | 1794                                                                              | 1609                                                                              |                                                                                   |
| Flt Permitted                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.94                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (perm)                 | 1791                                                                              |                                                                                   |                                                                                   | 1688                                                                              | 1609                                                                              |                                                                                   |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 422                                                                               | 17                                                                                | 38                                                                                | 462                                                                               | 45                                                                                | 98                                                                                |
| RTOR Reduction (vph)              | 3                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 61                                                                                | 0                                                                                 |
| Lane Group Flow (vph)             | 436                                                                               | 0                                                                                 | 0                                                                                 | 500                                                                               | 82                                                                                | 0                                                                                 |
| Turn Type                         | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Prot                                                                              |                                                                                   |
| Protected Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2                                                                                 |                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Actuated Green, G (s)             | 17.4                                                                              |                                                                                   |                                                                                   | 17.4                                                                              | 18.1                                                                              |                                                                                   |
| Effective Green, g (s)            | 17.4                                                                              |                                                                                   |                                                                                   | 17.4                                                                              | 18.1                                                                              |                                                                                   |
| Actuated g/C Ratio                | 0.37                                                                              |                                                                                   |                                                                                   | 0.37                                                                              | 0.38                                                                              |                                                                                   |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |
| Lane Grp Cap (vph)                | 656                                                                               |                                                                                   |                                                                                   | 618                                                                               | 613                                                                               |                                                                                   |
| v/s Ratio Prot                    | 0.24                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                   |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.30                                                                              |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.66                                                                              |                                                                                   |                                                                                   | 0.81                                                                              | 0.13                                                                              |                                                                                   |
| Uniform Delay, d1                 | 12.6                                                                              |                                                                                   |                                                                                   | 13.6                                                                              | 9.6                                                                               |                                                                                   |
| Progression Factor                | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Incremental Delay, d2             | 2.5                                                                               |                                                                                   |                                                                                   | 7.7                                                                               | 0.5                                                                               |                                                                                   |
| Delay (s)                         | 15.1                                                                              |                                                                                   |                                                                                   | 21.3                                                                              | 10.0                                                                              |                                                                                   |
| Level of Service                  | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| Approach Delay (s)                | 15.1                                                                              |                                                                                   |                                                                                   | 21.3                                                                              | 10.0                                                                              |                                                                                   |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 17.3                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 47.5                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 73.2%                                                                             |                                                                                   | ICU Level of Service                                                              | D                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |  |                                                                                     |  |  |  |  |
| Traffic Volume (vph)              | 0                                                                                 | 322                                                                               | 114                                                                               | 190                                                                               | 417                                                                               | 0                                                                                 | 195                                                                                 | 0                                                                                   | 299                                                                                 | 104                                                                                 | 295                                                                                 | 50                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 322                                                                               | 114                                                                               | 190                                                                               | 417                                                                               | 0                                                                                 | 195                                                                                 | 0                                                                                   | 299                                                                                 | 104                                                                                 | 295                                                                                 | 50                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                |                                                                                     | 0.85                                                                                | 1.00                                                                                | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1801                                                                              | 1531                                                                              | 1711                                                                              | 1801                                                                              |                                                                                   | 1711                                                                                |                                                                                     | 1531                                                                                | 1711                                                                                | 3347                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.53                                                                              | 1.00                                                                              |                                                                                   | 0.54                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1801                                                                              | 1531                                                                              | 952                                                                               | 1801                                                                              |                                                                                   | 981                                                                                 |                                                                                     | 1531                                                                                | 1711                                                                                | 3347                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 322                                                                               | 114                                                                               | 190                                                                               | 417                                                                               | 0                                                                                 | 195                                                                                 | 0                                                                                   | 299                                                                                 | 104                                                                                 | 295                                                                                 | 50                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 172                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 322                                                                               | 114                                                                               | 190                                                                               | 417                                                                               | 0                                                                                 | 195                                                                                 | 0                                                                                   | 127                                                                                 | 104                                                                                 | 345                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                |                                                                                     | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              |                                                                                   | 20.1                                                                                |                                                                                     | 20.1                                                                                | 20.1                                                                                | 20.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              |                                                                                   | 20.1                                                                                |                                                                                     | 20.1                                                                                | 20.1                                                                                | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.32                                                                              | 0.32                                                                              | 0.32                                                                              | 0.32                                                                              |                                                                                   | 0.42                                                                                |                                                                                     | 0.42                                                                                | 0.42                                                                                | 0.42                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 581                                                                               | 494                                                                               | 307                                                                               | 581                                                                               |                                                                                   | 415                                                                                 |                                                                                     | 649                                                                                 | 725                                                                                 | 1419                                                                                |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.18                                                                              |                                                                                   |                                                                                   | c0.23                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.10                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.07                                                                              | 0.20                                                                              |                                                                                   |                                                                                   | c0.20                                                                               |                                                                                     | 0.08                                                                                | 0.06                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.55                                                                              | 0.23                                                                              | 0.62                                                                              | 0.72                                                                              |                                                                                   | 0.47                                                                                |                                                                                     | 0.20                                                                                | 0.14                                                                                | 0.24                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 13.2                                                                              | 11.7                                                                              | 13.6                                                                              | 14.1                                                                              |                                                                                   | 9.8                                                                                 |                                                                                     | 8.6                                                                                 | 8.4                                                                                 | 8.8                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.1                                                                               | 0.2                                                                               | 3.7                                                                               | 4.2                                                                               |                                                                                   | 3.8                                                                                 |                                                                                     | 0.7                                                                                 | 0.4                                                                                 | 0.4                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 14.4                                                                              | 12.0                                                                              | 17.3                                                                              | 18.4                                                                              |                                                                                   | 13.6                                                                                |                                                                                     | 9.2                                                                                 | 8.8                                                                                 | 9.2                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   | B                                                                                   |                                                                                     | A                                                                                   | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.8                                                                              |                                                                                   |                                                                                   | 18.0                                                                              |                                                                                   |                                                                                     | 11.0                                                                                |                                                                                     |                                                                                     | 9.1                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.3                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.58                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 47.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 66.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 163                                                                               | 511                                                                               | 0                                                                                 | 0                                                                                 | 526                                                                               | 63                                                                                | 51                                                                                  | 302                                                                                 | 54                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 163                                                                               | 511                                                                               | 0                                                                                 | 0                                                                                 | 526                                                                               | 63                                                                                | 51                                                                                  | 302                                                                                 | 54                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                                | 0.98                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1775                                                                              |                                                                                   | 1711                                                                                | 1760                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.26                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 468                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1775                                                                              |                                                                                   | 1711                                                                                | 1760                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 163                                                                               | 511                                                                               | 0                                                                                 | 0                                                                                 | 526                                                                               | 63                                                                                | 51                                                                                  | 302                                                                                 | 54                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                   | 10                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 163                                                                               | 511                                                                               | 0                                                                                 | 0                                                                                 | 581                                                                               | 0                                                                                 | 51                                                                                  | 346                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 22.4                                                                              | 22.4                                                                              |                                                                                   |                                                                                   | 22.4                                                                              |                                                                                   | 19.3                                                                                | 19.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 22.4                                                                              | 22.4                                                                              |                                                                                   |                                                                                   | 22.4                                                                              |                                                                                   | 19.3                                                                                | 19.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.42                                                                              | 0.42                                                                              |                                                                                   |                                                                                   | 0.42                                                                              |                                                                                   | 0.36                                                                                | 0.36                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 195                                                                               | 751                                                                               |                                                                                   |                                                                                   | 740                                                                               |                                                                                   | 614                                                                                 | 632                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   | 0.33                                                                              |                                                                                   |                                                                                     | c0.20                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | c0.35                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.03                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.84                                                                              | 0.68                                                                              |                                                                                   |                                                                                   | 0.78                                                                              |                                                                                   | 0.08                                                                                | 0.55                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 14.0                                                                              | 12.7                                                                              |                                                                                   |                                                                                   | 13.6                                                                              |                                                                                   | 11.4                                                                                | 13.7                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 25.5                                                                              | 2.5                                                                               |                                                                                   |                                                                                   | 5.5                                                                               |                                                                                   | 0.3                                                                                 | 3.4                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 39.5                                                                              | 15.3                                                                              |                                                                                   |                                                                                   | 19.0                                                                              |                                                                                   | 11.6                                                                                | 17.1                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | D                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 21.1                                                                              |                                                                                   |                                                                                   | 19.0                                                                              |                                                                                   |                                                                                     | 16.4                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 19.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.70                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 53.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 74.7%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 47                                                                                | 508                                                                               | 42                                                                                | 58                                                                                | 507                                                                               | 46                                                                                | 63                                                                                 | 263                                                                                 | 57                                                                                  | 29                                                                                  | 189                                                                                 | 38                                                                                  |
| Future Volume (vph)               | 47                                                                                | 508                                                                               | 42                                                                                | 58                                                                                | 507                                                                               | 46                                                                                | 63                                                                                 | 263                                                                                 | 57                                                                                  | 29                                                                                  | 189                                                                                 | 38                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1777                                                                              |                                                                                   | 1711                                                                              | 1778                                                                              |                                                                                   |                                                                                    | 1750                                                                                |                                                                                     |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.93                                                                              |                                                                                   | 0.40                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.90                                                                                |                                                                                     |                                                                                     | 0.93                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1654                                                                              |                                                                                   | 728                                                                               | 1778                                                                              |                                                                                   |                                                                                    | 1591                                                                                |                                                                                     |                                                                                     | 1635                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 47                                                                                | 508                                                                               | 42                                                                                | 58                                                                                | 507                                                                               | 46                                                                                | 63                                                                                 | 263                                                                                 | 57                                                                                  | 29                                                                                  | 189                                                                                 | 38                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                  | 11                                                                                  | 0                                                                                   | 0                                                                                   | 11                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 592                                                                               | 0                                                                                 | 58                                                                                | 548                                                                               | 0                                                                                 | 0                                                                                  | 372                                                                                 | 0                                                                                   | 0                                                                                   | 245                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 28.1                                                                              |                                                                                   | 28.1                                                                              | 28.1                                                                              |                                                                                   |                                                                                    | 16.8                                                                                |                                                                                     |                                                                                     | 16.8                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 28.1                                                                              |                                                                                   | 28.1                                                                              | 28.1                                                                              |                                                                                   |                                                                                    | 16.8                                                                                |                                                                                     |                                                                                     | 16.8                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.49                                                                              |                                                                                   | 0.49                                                                              | 0.49                                                                              |                                                                                   |                                                                                    | 0.30                                                                                |                                                                                     |                                                                                     | 0.30                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 816                                                                               |                                                                                   | 359                                                                               | 878                                                                               |                                                                                   |                                                                                    | 469                                                                                 |                                                                                     |                                                                                     | 482                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.31                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.36                                                                             |                                                                                   | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.23                                                                               |                                                                                     |                                                                                     | 0.15                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.73                                                                              |                                                                                   | 0.16                                                                              | 0.62                                                                              |                                                                                   |                                                                                    | 0.79                                                                                |                                                                                     |                                                                                     | 0.51                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.4                                                                              |                                                                                   | 7.9                                                                               | 10.5                                                                              |                                                                                   |                                                                                    | 18.4                                                                                |                                                                                     |                                                                                     | 16.6                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 5.6                                                                               |                                                                                   | 1.0                                                                               | 3.3                                                                               |                                                                                   |                                                                                    | 8.9                                                                                 |                                                                                     |                                                                                     | 0.8                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 17.0                                                                              |                                                                                   | 8.9                                                                               | 13.9                                                                              |                                                                                   |                                                                                    | 27.4                                                                                |                                                                                     |                                                                                     | 17.5                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 17.0                                                                              |                                                                                   |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                    | 27.4                                                                                |                                                                                     |                                                                                     | 17.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 18.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.75                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 56.9                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 107.7%                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |  |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 490                                                                               | 57                                                                                | 146                                                                               | 572                                                                               | 89                                                                                | 151                                                                                 | 252                                                                                 | 187                                                                                 | 27                                                                                  | 115                                                                                 | 12                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 490                                                                               | 57                                                                                | 146                                                                               | 572                                                                               | 89                                                                                | 151                                                                                 | 252                                                                                 | 187                                                                                 | 27                                                                                  | 115                                                                                 | 12                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.98                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1775                                                                              |                                                                                   | 1711                                                                              | 1764                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   | 0.21                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1758                                                                              |                                                                                   | 385                                                                               | 1764                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1766                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 490                                                                               | 57                                                                                | 146                                                                               | 572                                                                               | 89                                                                                | 151                                                                                 | 252                                                                                 | 187                                                                                 | 27                                                                                  | 115                                                                                 | 12                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 153                                                                                 | 0                                                                                   | 3                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 543                                                                               | 0                                                                                 | 146                                                                               | 661                                                                               | 0                                                                                 | 151                                                                                 | 252                                                                                 | 34                                                                                  | 0                                                                                   | 151                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     | Split                                                                               | NA                                                                                  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   | 6                                                                                   |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 30.1                                                                              |                                                                                   | 41.2                                                                              | 41.2                                                                              |                                                                                   | 16.2                                                                                | 16.2                                                                                | 16.2                                                                                |                                                                                     | 12.7                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 30.1                                                                              |                                                                                   | 41.2                                                                              | 41.2                                                                              |                                                                                   | 16.2                                                                                | 16.2                                                                                | 16.2                                                                                |                                                                                     | 12.7                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.34                                                                              |                                                                                   | 0.47                                                                              | 0.47                                                                              |                                                                                   | 0.18                                                                                | 0.18                                                                                | 0.18                                                                                |                                                                                     | 0.14                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 606                                                                               |                                                                                   | 256                                                                               | 824                                                                               |                                                                                   | 314                                                                                 | 331                                                                                 | 281                                                                                 |                                                                                     | 254                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.31                                                                             |                                                                                   | 0.03                                                                              | c0.37                                                                             |                                                                                   | 0.09                                                                                | c0.14                                                                               |                                                                                     |                                                                                     | c0.09                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.23                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.90                                                                              |                                                                                   | 0.57                                                                              | 0.80                                                                              |                                                                                   | 0.48                                                                                | 0.76                                                                                | 0.12                                                                                |                                                                                     | 0.59                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 27.5                                                                              |                                                                                   | 30.2                                                                              | 20.0                                                                              |                                                                                   | 32.2                                                                                | 34.1                                                                                | 30.0                                                                                |                                                                                     | 35.3                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 18.4                                                                              |                                                                                   | 3.1                                                                               | 8.1                                                                               |                                                                                   | 1.2                                                                                 | 9.9                                                                                 | 0.2                                                                                 |                                                                                     | 3.7                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 45.9                                                                              |                                                                                   | 33.3                                                                              | 28.1                                                                              |                                                                                   | 33.3                                                                                | 44.0                                                                                | 30.2                                                                                |                                                                                     | 39.0                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 |                                                                                   | C                                                                                 | C                                                                                 |                                                                                   | C                                                                                   | D                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 45.9                                                                              |                                                                                   |                                                                                   | 29.0                                                                              |                                                                                   |                                                                                     | 36.9                                                                                |                                                                                     |                                                                                     | 39.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 36.4                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.82                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 106.3%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 16                                                                                | 361                                                                               | 88                                                                                | 76                                                                                | 454                                                                               | 59                                                                                | 58                                                                                 | 85                                                                                  | 56                                                                                  | 107                                                                                 | 187                                                                                 | 22                                                                                  |
| Future Volume (vph)               | 16                                                                                | 361                                                                               | 88                                                                                | 76                                                                                | 454                                                                               | 59                                                                                | 58                                                                                 | 85                                                                                  | 56                                                                                  | 107                                                                                 | 187                                                                                 | 22                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1752                                                                              |                                                                                   |                                                                                   | 1765                                                                              |                                                                                   |                                                                                    | 1765                                                                                | 1531                                                                                |                                                                                     | 1754                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                    | 0.80                                                                                | 1.00                                                                                |                                                                                     | 0.83                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1707                                                                              |                                                                                   |                                                                                   | 1587                                                                              |                                                                                   |                                                                                    | 1432                                                                                | 1531                                                                                |                                                                                     | 1482                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 16                                                                                | 361                                                                               | 88                                                                                | 76                                                                                | 454                                                                               | 59                                                                                | 58                                                                                 | 85                                                                                  | 56                                                                                  | 107                                                                                 | 187                                                                                 | 22                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 37                                                                                  | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 450                                                                               | 0                                                                                 | 0                                                                                 | 582                                                                               | 0                                                                                 | 0                                                                                  | 143                                                                                 | 19                                                                                  | 0                                                                                   | 311                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                    | 19.2                                                                                | 19.2                                                                                |                                                                                     | 19.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                    | 19.2                                                                                | 19.2                                                                                |                                                                                     | 19.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.35                                                                                |                                                                                     | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 745                                                                               |                                                                                   |                                                                                   | 693                                                                               |                                                                                   |                                                                                    | 496                                                                                 | 530                                                                                 |                                                                                     | 513                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.26                                                                              |                                                                                   |                                                                                   | 0.37                                                                              |                                                                                   |                                                                                    | 0.10                                                                                | 0.01                                                                                |                                                                                     | 0.21                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.60                                                                              |                                                                                   |                                                                                   | 0.84                                                                              |                                                                                   |                                                                                    | 0.29                                                                                | 0.04                                                                                |                                                                                     | 0.61                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.9                                                                              |                                                                                   |                                                                                   | 13.9                                                                              |                                                                                   |                                                                                    | 13.1                                                                                | 12.0                                                                                |                                                                                     | 15.0                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.4                                                                               |                                                                                   |                                                                                   | 8.8                                                                               |                                                                                   |                                                                                    | 1.5                                                                                 | 0.1                                                                                 |                                                                                     | 5.3                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 13.3                                                                              |                                                                                   |                                                                                   | 22.7                                                                              |                                                                                   |                                                                                    | 14.6                                                                                | 12.1                                                                                |                                                                                     | 20.2                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.3                                                                              |                                                                                   |                                                                                   | 22.7                                                                              |                                                                                   |                                                                                    | 13.9                                                                                |                                                                                     |                                                                                     | 20.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 18.3                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.74                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 55.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 95.3%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 16                                                                                | 376                                                                               | 87                                                                                | 62                                                                                | 366                                                                               | 57                                                                                | 100                                                                                | 81                                                                                  | 68                                                                                  | 68                                                                                  | 118                                                                                 | 14                                                                                  |
| Future Volume (vph)               | 16                                                                                | 376                                                                               | 87                                                                                | 62                                                                                | 366                                                                               | 57                                                                                | 100                                                                                | 81                                                                                  | 68                                                                                  | 68                                                                                  | 118                                                                                 | 14                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 |                                                                                   | 1797                                                                              | 1531                                                                              | 1711                                                                              | 1764                                                                              |                                                                                   |                                                                                    | 1752                                                                                | 1531                                                                                |                                                                                     | 1768                                                                                | 1531                                                                                |
| Flt Permitted                     |                                                                                   | 0.97                                                                              | 1.00                                                                              | 0.45                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.74                                                                                | 1.00                                                                                |                                                                                     | 0.83                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 |                                                                                   | 1748                                                                              | 1531                                                                              | 805                                                                               | 1764                                                                              |                                                                                   |                                                                                    | 1331                                                                                | 1531                                                                                |                                                                                     | 1493                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 16                                                                                | 376                                                                               | 87                                                                                | 62                                                                                | 366                                                                               | 57                                                                                | 100                                                                                | 81                                                                                  | 68                                                                                  | 68                                                                                  | 118                                                                                 | 14                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 58                                                                                | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 41                                                                                  | 0                                                                                   | 0                                                                                   | 8                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 392                                                                               | 29                                                                                | 62                                                                                | 410                                                                               | 0                                                                                 | 0                                                                                  | 181                                                                                 | 27                                                                                  | 0                                                                                   | 186                                                                                 | 6                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             |                                                                                   | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                |                                                                                     | 18.2                                                                                | 18.2                                                                                |
| Effective Green, g (s)            |                                                                                   | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              | 15.3                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                |                                                                                     | 18.2                                                                                | 18.2                                                                                |
| Actuated g/C Ratio                |                                                                                   | 0.34                                                                              | 0.34                                                                              | 0.34                                                                              | 0.34                                                                              |                                                                                   |                                                                                    | 0.40                                                                                | 0.40                                                                                |                                                                                     | 0.40                                                                                | 0.40                                                                                |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                |                                                                                   | 587                                                                               | 514                                                                               | 270                                                                               | 593                                                                               |                                                                                   |                                                                                    | 532                                                                                 | 612                                                                                 |                                                                                     | 597                                                                                 | 612                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.23                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.22                                                                              | 0.02                                                                              | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.14                                                                               | 0.02                                                                                |                                                                                     | 0.12                                                                                | 0.00                                                                                |
| v/c Ratio                         |                                                                                   | 0.67                                                                              | 0.06                                                                              | 0.23                                                                              | 0.69                                                                              |                                                                                   |                                                                                    | 0.34                                                                                | 0.04                                                                                |                                                                                     | 0.31                                                                                | 0.01                                                                                |
| Uniform Delay, d1                 |                                                                                   | 12.9                                                                              | 10.2                                                                              | 10.9                                                                              | 13.1                                                                              |                                                                                   |                                                                                    | 9.5                                                                                 | 8.3                                                                                 |                                                                                     | 9.4                                                                                 | 8.2                                                                                 |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             |                                                                                   | 2.9                                                                               | 0.0                                                                               | 0.4                                                                               | 3.5                                                                               |                                                                                   |                                                                                    | 1.7                                                                                 | 0.1                                                                                 |                                                                                     | 1.4                                                                                 | 0.0                                                                                 |
| Delay (s)                         |                                                                                   | 15.8                                                                              | 10.3                                                                              | 11.3                                                                              | 16.5                                                                              |                                                                                   |                                                                                    | 11.2                                                                                | 8.5                                                                                 |                                                                                     | 10.7                                                                                | 8.2                                                                                 |
| Level of Service                  |                                                                                   | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | A                                                                                   |                                                                                     | B                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 14.8                                                                              |                                                                                   |                                                                                   | 15.9                                                                              |                                                                                   |                                                                                    | 10.5                                                                                |                                                                                     |                                                                                     | 10.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.8                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.50                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 45.5                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 75.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 94                                                                                | 461                                                                               | 41                                                                                | 94                                                                                | 495                                                                               | 169                                                                               | 7                                                                                  | 128                                                                                 | 48                                                                                  | 273                                                                                 | 376                                                                                 | 115                                                                                 |
| Future Volume (vph)               | 94                                                                                | 461                                                                               | 41                                                                                | 94                                                                                | 495                                                                               | 169                                                                               | 7                                                                                  | 128                                                                                 | 48                                                                                  | 273                                                                                 | 376                                                                                 | 115                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.96                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1711                                                                              | 1779                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1734                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.32                                                                              | 1.00                                                                              |                                                                                   | 0.31                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 0.64                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 582                                                                               | 1779                                                                              |                                                                                   | 567                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1705                                                                                |                                                                                     | 1156                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 94                                                                                | 461                                                                               | 41                                                                                | 94                                                                                | 495                                                                               | 169                                                                               | 7                                                                                  | 128                                                                                 | 48                                                                                  | 273                                                                                 | 376                                                                                 | 115                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 107                                                                               | 0                                                                                  | 22                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 69                                                                                  |
| Lane Group Flow (vph)             | 94                                                                                | 496                                                                               | 0                                                                                 | 94                                                                                | 495                                                                               | 62                                                                                | 0                                                                                  | 161                                                                                 | 0                                                                                   | 273                                                                                 | 376                                                                                 | 46                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 18.8                                                                              | 18.8                                                                              |                                                                                   | 18.8                                                                              | 18.8                                                                              | 18.8                                                                              |                                                                                    | 20.2                                                                                |                                                                                     | 20.2                                                                                | 20.2                                                                                | 20.2                                                                                |
| Effective Green, g (s)            | 18.8                                                                              | 18.8                                                                              |                                                                                   | 18.8                                                                              | 18.8                                                                              | 18.8                                                                              |                                                                                    | 20.2                                                                                |                                                                                     | 20.2                                                                                | 20.2                                                                                | 20.2                                                                                |
| Actuated g/C Ratio                | 0.37                                                                              | 0.37                                                                              |                                                                                   | 0.37                                                                              | 0.37                                                                              | 0.37                                                                              |                                                                                    | 0.40                                                                                |                                                                                     | 0.40                                                                                | 0.40                                                                                | 0.40                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 214                                                                               | 655                                                                               |                                                                                   | 209                                                                               | 663                                                                               | 564                                                                               |                                                                                    | 675                                                                                 |                                                                                     | 457                                                                                 | 713                                                                                 | 606                                                                                 |
| v/s Ratio Prot                    |                                                                                   | c0.28                                                                             |                                                                                   |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | 0.21                                                                                |                                                                                     |
| v/s Ratio Perm                    | 0.16                                                                              |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   | 0.04                                                                              |                                                                                    | 0.09                                                                                |                                                                                     | c0.24                                                                               |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.44                                                                              | 0.76                                                                              |                                                                                   | 0.45                                                                              | 0.75                                                                              | 0.11                                                                              |                                                                                    | 0.24                                                                                |                                                                                     | 0.60                                                                                | 0.53                                                                                | 0.08                                                                                |
| Uniform Delay, d1                 | 12.1                                                                              | 14.1                                                                              |                                                                                   | 12.2                                                                              | 14.0                                                                              | 10.6                                                                              |                                                                                    | 10.3                                                                                |                                                                                     | 12.2                                                                                | 11.8                                                                                | 9.6                                                                                 |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 1.4                                                                               | 5.0                                                                               |                                                                                   | 1.5                                                                               | 4.6                                                                               | 0.1                                                                               |                                                                                    | 0.8                                                                                 |                                                                                     | 5.7                                                                                 | 2.8                                                                                 | 0.2                                                                                 |
| Delay (s)                         | 13.6                                                                              | 19.1                                                                              |                                                                                   | 13.7                                                                              | 18.6                                                                              | 10.7                                                                              |                                                                                    | 11.1                                                                                |                                                                                     | 17.8                                                                                | 14.5                                                                                | 9.8                                                                                 |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                    | B                                                                                   |                                                                                     | B                                                                                   | B                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 18.2                                                                              |                                                                                   |                                                                                   | 16.2                                                                              |                                                                                   |                                                                                    | 11.1                                                                                |                                                                                     |                                                                                     | 15.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.9                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.67                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 51.0                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 81.8%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 47                                                                                | 771                                                                               | 0                                                                                 | 0                                                                                 | 629                                                                               | 37                                                                                | 47                                                                                 | 275                                                                                 | 111                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 47                                                                                | 771                                                                               | 0                                                                                 | 0                                                                                 | 629                                                                               | 37                                                                                | 47                                                                                 | 275                                                                                 | 111                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1787                                                                              |                                                                                   |                                                                                    | 1788                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.24                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 429                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1787                                                                              |                                                                                   |                                                                                    | 1788                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 47                                                                                | 771                                                                               | 0                                                                                 | 0                                                                                 | 629                                                                               | 37                                                                                | 47                                                                                 | 275                                                                                 | 111                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 76                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 47                                                                                | 771                                                                               | 0                                                                                 | 0                                                                                 | 662                                                                               | 0                                                                                 | 0                                                                                  | 322                                                                                 | 35                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 27.7                                                                              | 27.7                                                                              |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 27.7                                                                              | 27.7                                                                              |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.48                                                                              | 0.48                                                                              |                                                                                   |                                                                                   | 0.48                                                                              |                                                                                   |                                                                                    | 0.31                                                                                | 0.31                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 205                                                                               | 863                                                                               |                                                                                   |                                                                                   | 856                                                                               |                                                                                   |                                                                                    | 559                                                                                 | 479                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.43                                                                             |                                                                                   |                                                                                   | 0.37                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.11                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.18                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.23                                                                              | 0.89                                                                              |                                                                                   |                                                                                   | 0.77                                                                              |                                                                                   |                                                                                    | 0.58                                                                                | 0.07                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 8.8                                                                               | 13.7                                                                              |                                                                                   |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                    | 16.6                                                                                | 14.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 11.6                                                                              |                                                                                   |                                                                                   | 4.4                                                                               |                                                                                   |                                                                                    | 4.3                                                                                 | 0.3                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 9.4                                                                               | 25.3                                                                              |                                                                                   |                                                                                   | 16.9                                                                              |                                                                                   |                                                                                    | 20.9                                                                                | 14.2                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 24.4                                                                              |                                                                                   |                                                                                   | 16.9                                                                              |                                                                                   |                                                                                    | 19.2                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 20.6                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.77                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 57.8                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 67.7%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 31                                                                                | 750                                                                               | 36                                                                                | 67                                                                                | 661                                                                               | 60                                                                                | 26                                                                                 | 280                                                                                 | 43                                                                                  | 68                                                                                  | 217                                                                                 | 24                                                                                  |
| Future Volume (vph)               | 31                                                                                | 750                                                                               | 36                                                                                | 67                                                                                | 661                                                                               | 60                                                                                | 26                                                                                 | 280                                                                                 | 43                                                                                  | 68                                                                                  | 217                                                                                 | 24                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1788                                                                              |                                                                                   | 1711                                                                              | 1778                                                                              |                                                                                   |                                                                                    | 1764                                                                                |                                                                                     |                                                                                     | 1762                                                                                |                                                                                     |
| Flt Permitted                     | 0.20                                                                              | 1.00                                                                              |                                                                                   | 0.14                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.82                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 353                                                                               | 1788                                                                              |                                                                                   | 257                                                                               | 1778                                                                              |                                                                                   |                                                                                    | 1695                                                                                |                                                                                     |                                                                                     | 1454                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 31                                                                                | 750                                                                               | 36                                                                                | 67                                                                                | 661                                                                               | 60                                                                                | 26                                                                                 | 280                                                                                 | 43                                                                                  | 68                                                                                  | 217                                                                                 | 24                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                  | 8                                                                                   | 0                                                                                   | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 31                                                                                | 783                                                                               | 0                                                                                 | 67                                                                                | 715                                                                               | 0                                                                                 | 0                                                                                  | 341                                                                                 | 0                                                                                   | 0                                                                                   | 304                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 28.3                                                                              | 28.3                                                                              |                                                                                   | 28.3                                                                              | 28.3                                                                              |                                                                                   |                                                                                    | 18.1                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 28.3                                                                              | 28.3                                                                              |                                                                                   | 28.3                                                                              | 28.3                                                                              |                                                                                   |                                                                                    | 18.1                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.48                                                                              | 0.48                                                                              |                                                                                   | 0.48                                                                              | 0.48                                                                              |                                                                                   |                                                                                    | 0.31                                                                                |                                                                                     |                                                                                     | 0.31                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 171                                                                               | 866                                                                               |                                                                                   | 124                                                                               | 861                                                                               |                                                                                   |                                                                                    | 525                                                                                 |                                                                                     |                                                                                     | 450                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.44                                                                             |                                                                                   |                                                                                   | 0.40                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.09                                                                              |                                                                                   |                                                                                   | 0.26                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.20                                                                                |                                                                                     |                                                                                     | c0.21                                                                               |                                                                                     |
| v/c Ratio                         | 0.18                                                                              | 0.90                                                                              |                                                                                   | 0.54                                                                              | 0.83                                                                              |                                                                                   |                                                                                    | 0.65                                                                                |                                                                                     |                                                                                     | 0.68                                                                                |                                                                                     |
| Uniform Delay, d1                 | 8.5                                                                               | 13.8                                                                              |                                                                                   | 10.5                                                                              | 13.0                                                                              |                                                                                   |                                                                                    | 17.4                                                                                |                                                                                     |                                                                                     | 17.6                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.5                                                                               | 12.7                                                                              |                                                                                   | 4.7                                                                               | 6.9                                                                               |                                                                                   |                                                                                    | 6.1                                                                                 |                                                                                     |                                                                                     | 7.9                                                                                 |                                                                                     |
| Delay (s)                         | 9.0                                                                               | 26.5                                                                              |                                                                                   | 15.2                                                                              | 19.8                                                                              |                                                                                   |                                                                                    | 23.5                                                                                |                                                                                     |                                                                                     | 25.5                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   | B                                                                                 | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 19.5                                                                              |                                                                                   |                                                                                    | 23.5                                                                                |                                                                                     |                                                                                     | 25.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 23.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 58.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 94.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

|                                   |  |       |       |       |      |      |                           |      |       |       |      |      |
|-----------------------------------|------------------------------------------------------------------------------------|-------|-------|-------|------|------|---------------------------|------|-------|-------|------|------|
| Movement                          | EBL                                                                                | EBT   | EBR   | WBL   | WBT  | WBR  | NBL                       | NBT  | NBR   | SBL   | SBT  | SBR  |
| Lane Configurations               |                                                                                    | ↑↑    |       | ↑     | ↑    | ↑    |                           | ↑    | ↑     | ↑↑    | ↑    |      |
| Traffic Volume (vph)              | 0                                                                                  | 1294  | 1     | 144   | 473  | 395  | 0                         | 146  | 334   | 381   | 131  | 17   |
| Future Volume (vph)               | 0                                                                                  | 1294  | 1     | 144   | 473  | 395  | 0                         | 146  | 334   | 381   | 131  | 17   |
| Ideal Flow (vphpl)                | 1900                                                                               | 1900  | 1900  | 1900  | 1900 | 1900 | 1900                      | 1900 | 1900  | 1900  | 1900 | 1900 |
| Total Lost time (s)               |                                                                                    | 6.0   |       | 6.0   | 6.0  | 6.0  |                           | 6.0  | 6.0   | 6.0   | 6.0  |      |
| Lane Util. Factor                 |                                                                                    | 0.95  |       | 1.00  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 0.97  | 1.00 |      |
| Frt                               |                                                                                    | 1.00  |       | 1.00  | 1.00 | 0.85 |                           | 1.00 | 0.85  | 1.00  | 0.98 |      |
| Flt Protected                     |                                                                                    | 1.00  |       | 0.95  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 0.95  | 1.00 |      |
| Satd. Flow (prot)                 |                                                                                    | 3421  |       | 1711  | 1801 | 1531 |                           | 1801 | 1531  | 3319  | 1770 |      |
| Flt Permitted                     |                                                                                    | 1.00  |       | 0.95  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 0.95  | 1.00 |      |
| Satd. Flow (perm)                 |                                                                                    | 3421  |       | 1711  | 1801 | 1531 |                           | 1801 | 1531  | 3319  | 1770 |      |
| Peak-hour factor, PHF             | 1.00                                                                               | 1.00  | 1.00  | 1.00  | 1.00 | 1.00 | 1.00                      | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0                                                                                  | 1294  | 1     | 144   | 473  | 395  | 0                         | 146  | 334   | 381   | 131  | 17   |
| RTOR Reduction (vph)              | 0                                                                                  | 0     | 0     | 0     | 0    | 0    | 0                         | 0    | 151   | 0     | 0    | 0    |
| Lane Group Flow (vph)             | 0                                                                                  | 1295  | 0     | 144   | 473  | 395  | 0                         | 146  | 183   | 381   | 148  | 0    |
| Turn Type                         |                                                                                    | NA    |       | Prot  | NA   | Prot |                           | NA   | Perm  | Prot  | NA   |      |
| Protected Phases                  |                                                                                    | 4     |       | 3     | 8    | 8    |                           | 2    |       | 1     | 6    |      |
| Permitted Phases                  |                                                                                    |       |       |       |      |      |                           |      | 2     |       |      |      |
| Actuated Green, G (s)             |                                                                                    | 38.1  |       | 9.0   | 53.1 | 53.1 |                           | 14.9 | 14.9  | 11.0  | 31.9 |      |
| Effective Green, g (s)            |                                                                                    | 38.1  |       | 9.0   | 53.1 | 53.1 |                           | 14.9 | 14.9  | 11.0  | 31.9 |      |
| Actuated g/C Ratio                |                                                                                    | 0.39  |       | 0.09  | 0.55 | 0.55 |                           | 0.15 | 0.15  | 0.11  | 0.33 |      |
| Clearance Time (s)                |                                                                                    | 6.0   |       | 6.0   | 6.0  | 6.0  |                           | 6.0  | 6.0   | 6.0   | 6.0  |      |
| Vehicle Extension (s)             |                                                                                    | 3.0   |       | 3.0   | 3.0  | 3.0  |                           | 3.0  | 3.0   | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)                |                                                                                    | 1343  |       | 158   | 985  | 838  |                           | 276  | 235   | 376   | 582  |      |
| v/s Ratio Prot                    |                                                                                    | c0.38 |       | c0.08 | 0.26 | 0.26 |                           | 0.08 |       | c0.11 | 0.08 |      |
| v/s Ratio Perm                    |                                                                                    |       |       |       |      |      |                           |      | c0.12 |       |      |      |
| v/c Ratio                         |                                                                                    | 0.96  |       | 0.91  | 0.48 | 0.47 |                           | 0.53 | 0.78  | 1.01  | 0.25 |      |
| Uniform Delay, d1                 |                                                                                    | 28.8  |       | 43.6  | 13.5 | 13.4 |                           | 37.8 | 39.5  | 43.0  | 23.8 |      |
| Progression Factor                |                                                                                    | 1.00  |       | 1.00  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 1.00  | 1.00 |      |
| Incremental Delay, d2             |                                                                                    | 17.4  |       | 46.4  | 1.7  | 1.9  |                           | 1.8  | 15.3  | 49.8  | 0.2  |      |
| Delay (s)                         |                                                                                    | 46.2  |       | 90.0  | 15.2 | 15.3 |                           | 39.6 | 54.8  | 92.8  | 24.1 |      |
| Level of Service                  |                                                                                    | D     |       | F     | B    | B    |                           | D    | D     | F     | C    |      |
| Approach Delay (s)                |                                                                                    | 46.2  |       |       | 25.9 |      |                           | 50.2 |       |       | 73.6 |      |
| Approach LOS                      |                                                                                    | D     |       |       | C    |      |                           | D    |       |       | E    |      |
| <b>Intersection Summary</b>       |                                                                                    |       |       |       |      |      |                           |      |       |       |      |      |
| HCM 2000 Control Delay            |                                                                                    |       | 44.9  |       |      |      | HCM 2000 Level of Service |      |       | D     |      |      |
| HCM 2000 Volume to Capacity ratio |                                                                                    |       | 0.93  |       |      |      |                           |      |       |       |      |      |
| Actuated Cycle Length (s)         |                                                                                    |       | 97.0  |       |      |      | Sum of lost time (s)      |      | 24.0  |       |      |      |
| Intersection Capacity Utilization |                                                                                    |       | 82.4% |       |      |      | ICU Level of Service      |      | E     |       |      |      |
| Analysis Period (min)             |                                                                                    |       | 15    |       |      |      |                           |      |       |       |      |      |
| c Critical Lane Group             |                                                                                    |       |       |       |      |      |                           |      |       |       |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                       | SBT                                                                               |
| Lane Configurations               |  |  |  |  |                           |  |
| Traffic Volume (vph)              | 166                                                                               | 83                                                                                | 318                                                                               | 188                                                                               | 316                       | 1371                                                                              |
| Future Volume (vph)               | 166                                                                               | 83                                                                                | 318                                                                               | 188                                                                               | 316                       | 1371                                                                              |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                      | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                           | 0.95                                                                              |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                           | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.99                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 3389                                                                              |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.80                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 2726                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                      | 1.00                                                                              |
| Adj. Flow (vph)                   | 166                                                                               | 83                                                                                | 318                                                                               | 188                                                                               | 316                       | 1371                                                                              |
| RTOR Reduction (vph)              | 0                                                                                 | 70                                                                                | 0                                                                                 | 54                                                                                | 0                         | 0                                                                                 |
| Lane Group Flow (vph)             | 166                                                                               | 13                                                                                | 318                                                                               | 134                                                                               | 0                         | 1687                                                                              |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                      | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                           | 6                                                                                 |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                         |                                                                                   |
| Actuated Green, G (s)             | 13.5                                                                              | 13.5                                                                              | 63.0                                                                              | 63.0                                                                              |                           | 63.0                                                                              |
| Effective Green, g (s)            | 13.5                                                                              | 13.5                                                                              | 63.0                                                                              | 63.0                                                                              |                           | 63.0                                                                              |
| Actuated g/C Ratio                | 0.15                                                                              | 0.15                                                                              | 0.71                                                                              | 0.71                                                                              |                           | 0.71                                                                              |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                           | 3.0                                                                               |
| Lane Grp Cap (vph)                | 261                                                                               | 233                                                                               | 1282                                                                              | 1917                                                                              |                           | 1940                                                                              |
| v/s Ratio Prot                    | c0.10                                                                             |                                                                                   | 0.18                                                                              |                                                                                   |                           |                                                                                   |
| v/s Ratio Perm                    |                                                                                   | 0.01                                                                              |                                                                                   | 0.05                                                                              |                           | c0.62                                                                             |
| v/c Ratio                         | 0.64                                                                              | 0.05                                                                              | 0.25                                                                              | 0.07                                                                              |                           | 0.87                                                                              |
| Uniform Delay, d1                 | 35.2                                                                              | 32.0                                                                              | 4.5                                                                               | 3.9                                                                               |                           | 9.6                                                                               |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 1.00                                                                              |
| Incremental Delay, d2             | 5.0                                                                               | 0.1                                                                               | 0.5                                                                               | 0.1                                                                               |                           | 5.6                                                                               |
| Delay (s)                         | 40.2                                                                              | 32.1                                                                              | 4.9                                                                               | 3.9                                                                               |                           | 15.3                                                                              |
| Level of Service                  | D                                                                                 | C                                                                                 | A                                                                                 | A                                                                                 |                           | B                                                                                 |
| Approach Delay (s)                | 37.5                                                                              |                                                                                   | 4.6                                                                               |                                                                                   |                           | 15.3                                                                              |
| Approach LOS                      | D                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                           | B                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.3                                                                              |                                                                                   | HCM 2000 Level of Service | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.83                                                                              |                                                                                   |                           |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.5                                                                              |                                                                                   | Sum of lost time (s)      | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 88.0%                                                                             |                                                                                   | ICU Level of Service      | E                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                           |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   | →    | ↘    | ↙     | ←     | ↖                         | ↗    |
|-----------------------------------|------|------|-------|-------|---------------------------|------|
| Movement                          | EBT  | EBR  | WBL   | WBT   | NBL                       | NBR  |
| Lane Configurations               | ↰    |      |       | ↱     | ↰                         | ↱    |
| Traffic Volume (vph)              | 383  | 41   | 93    | 343   | 19                        | 23   |
| Future Volume (vph)               | 383  | 41   | 93    | 343   | 19                        | 23   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900                      | 1900 |
| Total Lost time (s)               | 6.0  |      |       | 6.0   | 6.0                       |      |
| Lane Util. Factor                 | 1.00 |      |       | 1.00  | 1.00                      |      |
| Frt                               | 0.99 |      |       | 1.00  | 0.93                      |      |
| Flt Protected                     | 1.00 |      |       | 0.99  | 0.98                      |      |
| Satd. Flow (prot)                 | 1777 |      |       | 1782  | 1631                      |      |
| Flt Permitted                     | 1.00 |      |       | 0.72  | 0.98                      |      |
| Satd. Flow (perm)                 | 1777 |      |       | 1295  | 1631                      |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00  | 1.00                      | 1.00 |
| Adj. Flow (vph)                   | 383  | 41   | 93    | 343   | 19                        | 23   |
| RTOR Reduction (vph)              | 8    | 0    | 0     | 0     | 15                        | 0    |
| Lane Group Flow (vph)             | 416  | 0    | 0     | 436   | 27                        | 0    |
| Turn Type                         | NA   |      | Perm  | NA    | Prot                      |      |
| Protected Phases                  | 4    |      |       | 8     | 2                         |      |
| Permitted Phases                  |      |      | 8     |       |                           |      |
| Actuated Green, G (s)             | 19.1 |      |       | 19.1  | 18.2                      |      |
| Effective Green, g (s)            | 19.1 |      |       | 19.1  | 18.2                      |      |
| Actuated g/C Ratio                | 0.39 |      |       | 0.39  | 0.37                      |      |
| Clearance Time (s)                | 6.0  |      |       | 6.0   | 6.0                       |      |
| Vehicle Extension (s)             | 3.0  |      |       | 3.0   | 3.0                       |      |
| Lane Grp Cap (vph)                | 688  |      |       | 501   | 602                       |      |
| v/s Ratio Prot                    | 0.23 |      |       |       | c0.02                     |      |
| v/s Ratio Perm                    |      |      |       | c0.34 |                           |      |
| v/c Ratio                         | 0.60 |      |       | 0.87  | 0.05                      |      |
| Uniform Delay, d1                 | 12.1 |      |       | 14.0  | 10.0                      |      |
| Progression Factor                | 1.00 |      |       | 1.00  | 1.00                      |      |
| Incremental Delay, d2             | 1.5  |      |       | 15.2  | 0.1                       |      |
| Delay (s)                         | 13.6 |      |       | 29.1  | 10.1                      |      |
| Level of Service                  | B    |      |       | C     | B                         |      |
| Approach Delay (s)                | 13.6 |      |       | 29.1  | 10.1                      |      |
| Approach LOS                      | B    |      |       | C     | B                         |      |
| <b>Intersection Summary</b>       |      |      |       |       |                           |      |
| HCM 2000 Control Delay            |      |      | 20.9  |       | HCM 2000 Level of Service | C    |
| HCM 2000 Volume to Capacity ratio |      |      | 0.47  |       |                           |      |
| Actuated Cycle Length (s)         |      |      | 49.3  |       | Sum of lost time (s)      | 12.0 |
| Intersection Capacity Utilization |      |      | 65.0% |       | ICU Level of Service      | C    |
| Analysis Period (min)             |      |      | 15    |       |                           |      |
| c Critical Lane Group             |      |      |       |       |                           |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT   | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|-------|------|-------|---------------------------|-------|------|------|------|------|------|
| Lane Configurations               |      | ↑    | ↑     | ↑    | ↑     |                           | ↑     |      | ↑    | ↑    | ↑↓   | ↑    |
| Traffic Volume (vph)              | 0    | 191  | 103   | 191  | 424   | 0                         | 130   | 0    | 106  | 61   | 372  | 86   |
| Future Volume (vph)               | 0    | 191  | 103   | 191  | 424   | 0                         | 130   | 0    | 106  | 61   | 372  | 86   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900 | 1900  | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0  | 6.0   | 6.0  | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Lane Util. Factor                 |      | 1.00 | 1.00  | 1.00 | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 0.95 |      |
| Frt                               |      | 1.00 | 0.85  | 1.00 | 1.00  |                           | 1.00  |      | 0.85 | 1.00 | 0.97 |      |
| Flt Protected                     |      | 1.00 | 1.00  | 0.95 | 1.00  |                           | 0.95  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (prot)                 |      | 1801 | 1531  | 1711 | 1801  |                           | 1711  |      | 1531 | 1711 | 3325 |      |
| Flt Permitted                     |      | 1.00 | 1.00  | 0.64 | 1.00  |                           | 0.49  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (perm)                 |      | 1801 | 1531  | 1148 | 1801  |                           | 879   |      | 1531 | 1711 | 3325 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00 | 1.00  | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 191  | 103   | 191  | 424   | 0                         | 130   | 0    | 106  | 61   | 372  | 86   |
| RTOR Reduction (vph)              | 0    | 0    | 0     | 0    | 0     | 0                         | 0     | 0    | 64   | 0    | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 191  | 103   | 191  | 424   | 0                         | 130   | 0    | 42   | 61   | 458  | 0    |
| Turn Type                         |      | NA   | Perm  | Perm | NA    |                           | Perm  |      | Perm | Perm | NA   |      |
| Protected Phases                  |      | 4    |       |      | 8     |                           |       |      |      |      | 6    |      |
| Permitted Phases                  |      |      | 4     | 8    |       |                           | 2     |      | 2    | 6    |      |      |
| Actuated Green, G (s)             |      | 15.9 | 15.9  | 15.9 | 15.9  |                           | 18.1  |      | 18.1 | 18.1 | 18.1 |      |
| Effective Green, g (s)            |      | 15.9 | 15.9  | 15.9 | 15.9  |                           | 18.1  |      | 18.1 | 18.1 | 18.1 |      |
| Actuated g/C Ratio                |      | 0.35 | 0.35  | 0.35 | 0.35  |                           | 0.39  |      | 0.39 | 0.39 | 0.39 |      |
| Clearance Time (s)                |      | 6.0  | 6.0   | 6.0  | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  | 3.0   | 3.0  | 3.0   |                           | 3.0   |      | 3.0  | 3.0  | 3.0  |      |
| Lane Grp Cap (vph)                |      | 622  | 529   | 396  | 622   |                           | 345   |      | 602  | 673  | 1308 |      |
| v/s Ratio Prot                    |      | 0.11 |       |      | c0.24 |                           |       |      |      |      | 0.14 |      |
| v/s Ratio Perm                    |      |      | 0.07  | 0.17 |       |                           | c0.15 |      | 0.03 | 0.04 |      |      |
| v/c Ratio                         |      | 0.31 | 0.19  | 0.48 | 0.68  |                           | 0.38  |      | 0.07 | 0.09 | 0.35 |      |
| Uniform Delay, d1                 |      | 11.0 | 10.6  | 11.8 | 12.9  |                           | 9.9   |      | 8.7  | 8.8  | 9.8  |      |
| Progression Factor                |      | 1.00 | 1.00  | 1.00 | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 1.00 |      |
| Incremental Delay, d2             |      | 0.3  | 0.2   | 0.9  | 3.1   |                           | 3.1   |      | 0.2  | 0.3  | 0.7  |      |
| Delay (s)                         |      | 11.3 | 10.7  | 12.7 | 16.0  |                           | 13.1  |      | 8.9  | 9.0  | 10.6 |      |
| Level of Service                  |      | B    | B     | B    | B     |                           | B     |      | A    | A    | B    |      |
| Approach Delay (s)                |      | 11.1 |       |      | 15.0  |                           |       | 11.2 |      |      | 10.4 |      |
| Approach LOS                      |      | B    |       |      | B     |                           |       | B    |      |      | B    |      |
| <b>Intersection Summary</b>       |      |      |       |      |       |                           |       |      |      |      |      |      |
| HCM 2000 Control Delay            |      |      | 12.3  |      |       | HCM 2000 Level of Service |       |      |      | B    |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.52  |      |       |                           |       |      |      |      |      |      |
| Actuated Cycle Length (s)         |      |      | 46.0  |      |       | Sum of lost time (s)      |       |      | 12.0 |      |      |      |
| Intersection Capacity Utilization |      |      | 59.2% |      |       | ICU Level of Service      |       |      | B    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |       |                           |       |      |      |      |      |      |
| c Critical Lane Group             |      |      |       |      |       |                           |       |      |      |      |      |      |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 56                                                                                | 332                                                                               | 0                                                                                 | 0                                                                                 | 512                                                                               | 69                                                                                | 31                                                                                  | 108                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 56                                                                                | 332                                                                               | 0                                                                                 | 0                                                                                 | 512                                                                               | 69                                                                                | 31                                                                                  | 108                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                                | 0.95                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1772                                                                              |                                                                                   | 1711                                                                                | 1713                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.26                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 471                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1772                                                                              |                                                                                   | 1711                                                                                | 1713                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 56                                                                                | 332                                                                               | 0                                                                                 | 0                                                                                 | 512                                                                               | 69                                                                                | 31                                                                                  | 108                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                   | 30                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 56                                                                                | 332                                                                               | 0                                                                                 | 0                                                                                 | 571                                                                               | 0                                                                                 | 31                                                                                  | 130                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 20.3                                                                              | 20.3                                                                              |                                                                                   |                                                                                   | 20.3                                                                              |                                                                                   | 18.2                                                                                | 18.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 20.3                                                                              | 20.3                                                                              |                                                                                   |                                                                                   | 20.3                                                                              |                                                                                   | 18.2                                                                                | 18.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.40                                                                              | 0.40                                                                              |                                                                                   |                                                                                   | 0.40                                                                              |                                                                                   | 0.36                                                                                | 0.36                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 189                                                                               | 723                                                                               |                                                                                   |                                                                                   | 712                                                                               |                                                                                   | 616                                                                                 | 617                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.18                                                                              |                                                                                   |                                                                                   | c0.32                                                                             |                                                                                   |                                                                                     | c0.08                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.12                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.30                                                                              | 0.46                                                                              |                                                                                   |                                                                                   | 0.80                                                                              |                                                                                   | 0.05                                                                                | 0.21                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 10.3                                                                              | 11.1                                                                              |                                                                                   |                                                                                   | 13.3                                                                              |                                                                                   | 10.5                                                                                | 11.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.9                                                                               | 0.5                                                                               |                                                                                   |                                                                                   | 6.5                                                                               |                                                                                   | 0.2                                                                                 | 0.8                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 11.1                                                                              | 11.5                                                                              |                                                                                   |                                                                                   | 19.8                                                                              |                                                                                   | 10.7                                                                                | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.5                                                                              |                                                                                   |                                                                                   | 19.8                                                                              |                                                                                   |                                                                                     | 11.7                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.7                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.52                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 50.5                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 59.2%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 14                                                                                | 347                                                                               | 47                                                                                | 51                                                                                | 503                                                                               | 18                                                                                | 33                                                                                 | 110                                                                                 | 52                                                                                  | 26                                                                                  | 247                                                                                 | 35                                                                                  |
| Future Volume (vph)               | 14                                                                                | 347                                                                               | 47                                                                                | 51                                                                                | 503                                                                               | 18                                                                                | 33                                                                                 | 110                                                                                 | 52                                                                                  | 26                                                                                  | 247                                                                                 | 35                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1770                                                                              |                                                                                   | 1711                                                                              | 1791                                                                              |                                                                                   |                                                                                    | 1721                                                                                |                                                                                     |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.98                                                                              |                                                                                   | 0.54                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.91                                                                                |                                                                                     |                                                                                     | 0.95                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1730                                                                              |                                                                                   | 980                                                                               | 1791                                                                              |                                                                                   |                                                                                    | 1575                                                                                |                                                                                     |                                                                                     | 1693                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 14                                                                                | 347                                                                               | 47                                                                                | 51                                                                                | 503                                                                               | 18                                                                                | 33                                                                                 | 110                                                                                 | 52                                                                                  | 26                                                                                  | 247                                                                                 | 35                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 29                                                                                  | 0                                                                                   | 0                                                                                   | 10                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 399                                                                               | 0                                                                                 | 51                                                                                | 519                                                                               | 0                                                                                 | 0                                                                                  | 166                                                                                 | 0                                                                                   | 0                                                                                   | 298                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.1                                                                              |                                                                                   | 20.1                                                                              | 20.1                                                                              |                                                                                   |                                                                                    | 12.6                                                                                |                                                                                     |                                                                                     | 12.6                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 20.1                                                                              |                                                                                   | 20.1                                                                              | 20.1                                                                              |                                                                                   |                                                                                    | 12.6                                                                                |                                                                                     |                                                                                     | 12.6                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.45                                                                              |                                                                                   | 0.45                                                                              | 0.45                                                                              |                                                                                   |                                                                                    | 0.28                                                                                |                                                                                     |                                                                                     | 0.28                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 777                                                                               |                                                                                   | 440                                                                               | 805                                                                               |                                                                                   |                                                                                    | 443                                                                                 |                                                                                     |                                                                                     | 477                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | c0.29                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.23                                                                              |                                                                                   | 0.05                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.11                                                                                |                                                                                     |                                                                                     | c0.18                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.51                                                                              |                                                                                   | 0.12                                                                              | 0.64                                                                              |                                                                                   |                                                                                    | 0.37                                                                                |                                                                                     |                                                                                     | 0.62                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 8.8                                                                               |                                                                                   | 7.1                                                                               | 9.5                                                                               |                                                                                   |                                                                                    | 12.9                                                                                |                                                                                     |                                                                                     | 14.0                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 2.4                                                                               |                                                                                   | 0.5                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 0.5                                                                                 |                                                                                     |                                                                                     | 2.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 11.2                                                                              |                                                                                   | 7.7                                                                               | 13.5                                                                              |                                                                                   |                                                                                    | 13.4                                                                                |                                                                                     |                                                                                     | 16.5                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 13.0                                                                              |                                                                                   |                                                                                    | 13.4                                                                                |                                                                                     |                                                                                     | 16.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.3                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.64                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 44.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.6%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |  |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 399                                                                               | 77                                                                                | 203                                                                               | 539                                                                               | 46                                                                                | 78                                                                                  | 76                                                                                  | 125                                                                                 | 39                                                                                  | 231                                                                                 | 27                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 399                                                                               | 77                                                                                | 203                                                                               | 539                                                                               | 46                                                                                | 78                                                                                  | 76                                                                                  | 125                                                                                 | 39                                                                                  | 231                                                                                 | 27                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1761                                                                              |                                                                                   | 1711                                                                              | 1779                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1767                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.24                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1761                                                                              |                                                                                   | 430                                                                               | 1779                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1767                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 399                                                                               | 77                                                                                | 203                                                                               | 539                                                                               | 46                                                                                | 78                                                                                  | 76                                                                                  | 125                                                                                 | 39                                                                                  | 231                                                                                 | 27                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 110                                                                                 | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 468                                                                               | 0                                                                                 | 203                                                                               | 585                                                                               | 0                                                                                 | 78                                                                                  | 76                                                                                  | 15                                                                                  | 0                                                                                   | 293                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     | Split                                                                               | NA                                                                                  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   | 6                                                                                   |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.1                                                                              |                                                                                   | 31.1                                                                              | 31.1                                                                              |                                                                                   | 8.9                                                                                 | 8.9                                                                                 | 8.9                                                                                 |                                                                                     | 16.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 20.1                                                                              |                                                                                   | 31.1                                                                              | 31.1                                                                              |                                                                                   | 8.9                                                                                 | 8.9                                                                                 | 8.9                                                                                 |                                                                                     | 16.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.27                                                                              |                                                                                   | 0.42                                                                              | 0.42                                                                              |                                                                                   | 0.12                                                                                | 0.12                                                                                | 0.12                                                                                |                                                                                     | 0.22                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 477                                                                               |                                                                                   | 266                                                                               | 746                                                                               |                                                                                   | 205                                                                                 | 216                                                                                 | 183                                                                                 |                                                                                     | 383                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.27                                                                             |                                                                                   | 0.05                                                                              | c0.33                                                                             |                                                                                   | c0.05                                                                               | 0.04                                                                                |                                                                                     |                                                                                     | c0.17                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.98                                                                              |                                                                                   | 0.76                                                                              | 0.78                                                                              |                                                                                   | 0.38                                                                                | 0.35                                                                                | 0.08                                                                                |                                                                                     | 0.77                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 26.8                                                                              |                                                                                   | 26.6                                                                              | 18.6                                                                              |                                                                                   | 30.1                                                                                | 30.0                                                                                | 29.0                                                                                |                                                                                     | 27.2                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 36.8                                                                              |                                                                                   | 12.2                                                                              | 8.1                                                                               |                                                                                   | 1.2                                                                                 | 1.0                                                                                 | 0.2                                                                                 |                                                                                     | 8.8                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 63.6                                                                              |                                                                                   | 38.8                                                                              | 26.7                                                                              |                                                                                   | 31.2                                                                                | 30.9                                                                                | 29.2                                                                                |                                                                                     | 36.0                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | E                                                                                 |                                                                                   | D                                                                                 | C                                                                                 |                                                                                   | C                                                                                   | C                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 63.6                                                                              |                                                                                   |                                                                                   | 29.8                                                                              |                                                                                   |                                                                                     | 30.2                                                                                |                                                                                     |                                                                                     | 36.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 39.6                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.82                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 74.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 94.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 6                                                                                 | 459                                                                               | 229                                                                               | 78                                                                                | 451                                                                               | 91                                                                                | 218                                                                                | 183                                                                                 | 73                                                                                  | 31                                                                                  | 127                                                                                 | 15                                                                                  |
| Future Volume (vph)               | 6                                                                                 | 459                                                                               | 229                                                                               | 78                                                                                | 451                                                                               | 91                                                                                | 218                                                                                | 183                                                                                 | 73                                                                                  | 31                                                                                  | 127                                                                                 | 15                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.96                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1720                                                                              |                                                                                   |                                                                                   | 1754                                                                              |                                                                                   |                                                                                    | 1753                                                                                | 1531                                                                                |                                                                                     | 1764                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.82                                                                              |                                                                                   |                                                                                    | 0.76                                                                                | 1.00                                                                                |                                                                                     | 0.89                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1711                                                                              |                                                                                   |                                                                                   | 1442                                                                              |                                                                                   |                                                                                    | 1374                                                                                | 1531                                                                                |                                                                                     | 1578                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 6                                                                                 | 459                                                                               | 229                                                                               | 78                                                                                | 451                                                                               | 91                                                                                | 218                                                                                | 183                                                                                 | 73                                                                                  | 31                                                                                  | 127                                                                                 | 15                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 26                                                                                | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 46                                                                                  | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 668                                                                               | 0                                                                                 | 0                                                                                 | 611                                                                               | 0                                                                                 | 0                                                                                  | 401                                                                                 | 27                                                                                  | 0                                                                                   | 168                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 30.7                                                                              |                                                                                   |                                                                                   | 30.7                                                                              |                                                                                   |                                                                                    | 25.1                                                                                | 25.1                                                                                |                                                                                     | 25.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 30.7                                                                              |                                                                                   |                                                                                   | 30.7                                                                              |                                                                                   |                                                                                    | 25.1                                                                                | 25.1                                                                                |                                                                                     | 25.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.45                                                                              |                                                                                   |                                                                                   | 0.45                                                                              |                                                                                   |                                                                                    | 0.37                                                                                | 0.37                                                                                |                                                                                     | 0.37                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 774                                                                               |                                                                                   |                                                                                   | 652                                                                               |                                                                                   |                                                                                    | 508                                                                                 | 566                                                                                 |                                                                                     | 584                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   | c0.42                                                                             |                                                                                   |                                                                                    | c0.29                                                                               | 0.02                                                                                |                                                                                     | 0.11                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                    | 0.79                                                                                | 0.05                                                                                |                                                                                     | 0.29                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 16.7                                                                              |                                                                                   |                                                                                   | 17.6                                                                              |                                                                                   |                                                                                    | 19.0                                                                                | 13.7                                                                                |                                                                                     | 15.0                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 9.8                                                                               |                                                                                   |                                                                                   | 20.9                                                                              |                                                                                   |                                                                                    | 11.8                                                                                | 0.2                                                                                 |                                                                                     | 1.2                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 26.4                                                                              |                                                                                   |                                                                                   | 38.5                                                                              |                                                                                   |                                                                                    | 30.8                                                                                | 13.8                                                                                |                                                                                     | 16.3                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 26.4                                                                              |                                                                                   |                                                                                   | 38.5                                                                              |                                                                                   |                                                                                    | 28.2                                                                                |                                                                                     |                                                                                     | 16.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 29.8                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.87                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 67.8                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 123.0%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 4                                                                                 | 370                                                                               | 71                                                                                | 65                                                                                | 445                                                                               | 74                                                                                | 113                                                                                | 134                                                                                 | 52                                                                                  | 18                                                                                  | 37                                                                                  | 18                                                                                  |
| Future Volume (vph)               | 4                                                                                 | 370                                                                               | 71                                                                                | 65                                                                                | 445                                                                               | 74                                                                                | 113                                                                                | 134                                                                                 | 52                                                                                  | 18                                                                                  | 37                                                                                  | 18                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 |                                                                                   | 1800                                                                              | 1531                                                                              | 1711                                                                              | 1762                                                                              |                                                                                   |                                                                                    | 1760                                                                                | 1531                                                                                |                                                                                     | 1772                                                                                | 1531                                                                                |
| Flt Permitted                     |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.48                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.83                                                                                | 1.00                                                                                |                                                                                     | 0.87                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 |                                                                                   | 1789                                                                              | 1531                                                                              | 865                                                                               | 1762                                                                              |                                                                                   |                                                                                    | 1488                                                                                | 1531                                                                                |                                                                                     | 1571                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 4                                                                                 | 370                                                                               | 71                                                                                | 65                                                                                | 445                                                                               | 74                                                                                | 113                                                                                | 134                                                                                 | 52                                                                                  | 18                                                                                  | 37                                                                                  | 18                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 45                                                                                | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 32                                                                                  | 0                                                                                   | 0                                                                                   | 11                                                                                  |
| Lane Group Flow (vph)             | 0                                                                                 | 374                                                                               | 26                                                                                | 65                                                                                | 506                                                                               | 0                                                                                 | 0                                                                                  | 247                                                                                 | 20                                                                                  | 0                                                                                   | 55                                                                                  | 7                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             |                                                                                   | 17.4                                                                              | 17.4                                                                              | 17.4                                                                              | 17.4                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                |
| Effective Green, g (s)            |                                                                                   | 17.4                                                                              | 17.4                                                                              | 17.4                                                                              | 17.4                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                |
| Actuated g/C Ratio                |                                                                                   | 0.37                                                                              | 0.37                                                                              | 0.37                                                                              | 0.37                                                                              |                                                                                   |                                                                                    | 0.38                                                                                | 0.38                                                                                |                                                                                     | 0.38                                                                                | 0.38                                                                                |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                |                                                                                   | 655                                                                               | 560                                                                               | 316                                                                               | 645                                                                               |                                                                                   |                                                                                    | 567                                                                                 | 583                                                                                 |                                                                                     | 598                                                                                 | 583                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.29                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.21                                                                              | 0.02                                                                              | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.17                                                                               | 0.01                                                                                |                                                                                     | 0.04                                                                                | 0.00                                                                                |
| v/c Ratio                         |                                                                                   | 0.57                                                                              | 0.05                                                                              | 0.21                                                                              | 0.79                                                                              |                                                                                   |                                                                                    | 0.44                                                                                | 0.03                                                                                |                                                                                     | 0.09                                                                                | 0.01                                                                                |
| Uniform Delay, d1                 |                                                                                   | 12.1                                                                              | 9.7                                                                               | 10.3                                                                              | 13.4                                                                              |                                                                                   |                                                                                    | 10.9                                                                                | 9.2                                                                                 |                                                                                     | 9.4                                                                                 | 9.1                                                                                 |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             |                                                                                   | 1.2                                                                               | 0.0                                                                               | 0.3                                                                               | 6.2                                                                               |                                                                                   |                                                                                    | 2.4                                                                                 | 0.1                                                                                 |                                                                                     | 0.3                                                                                 | 0.0                                                                                 |
| Delay (s)                         |                                                                                   | 13.3                                                                              | 9.7                                                                               | 10.6                                                                              | 19.6                                                                              |                                                                                   |                                                                                    | 13.3                                                                                | 9.3                                                                                 |                                                                                     | 9.7                                                                                 | 9.2                                                                                 |
| Level of Service                  |                                                                                   | B                                                                                 | A                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 12.7                                                                              |                                                                                   |                                                                                   | 18.6                                                                              |                                                                                   |                                                                                    | 12.6                                                                                |                                                                                     |                                                                                     | 9.6                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 47.5                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 82.6%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 42                                                                                | 359                                                                               | 19                                                                                | 112                                                                               | 470                                                                               | 140                                                                               | 11                                                                                 | 59                                                                                  | 12                                                                                  | 93                                                                                  | 346                                                                                 | 108                                                                                 |
| Future Volume (vph)               | 42                                                                                | 359                                                                               | 19                                                                                | 112                                                                               | 470                                                                               | 140                                                                               | 11                                                                                 | 59                                                                                  | 12                                                                                  | 93                                                                                  | 346                                                                                 | 108                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.99                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1711                                                                              | 1787                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1753                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.36                                                                              | 1.00                                                                              |                                                                                   | 0.47                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.94                                                                                |                                                                                     | 0.70                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 644                                                                               | 1787                                                                              |                                                                                   | 852                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1652                                                                                |                                                                                     | 1267                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 42                                                                                | 359                                                                               | 19                                                                                | 112                                                                               | 470                                                                               | 140                                                                               | 11                                                                                 | 59                                                                                  | 12                                                                                  | 93                                                                                  | 346                                                                                 | 108                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 90                                                                                | 0                                                                                  | 7                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 66                                                                                  |
| Lane Group Flow (vph)             | 42                                                                                | 374                                                                               | 0                                                                                 | 112                                                                               | 470                                                                               | 50                                                                                | 0                                                                                  | 75                                                                                  | 0                                                                                   | 93                                                                                  | 346                                                                                 | 42                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 16.8                                                                              | 16.8                                                                              |                                                                                   | 16.8                                                                              | 16.8                                                                              | 16.8                                                                              |                                                                                    | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |
| Effective Green, g (s)            | 16.8                                                                              | 16.8                                                                              |                                                                                   | 16.8                                                                              | 16.8                                                                              | 16.8                                                                              |                                                                                    | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |
| Actuated g/C Ratio                | 0.36                                                                              | 0.36                                                                              |                                                                                   | 0.36                                                                              | 0.36                                                                              | 0.36                                                                              |                                                                                    | 0.39                                                                                |                                                                                     | 0.39                                                                                | 0.39                                                                                | 0.39                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 230                                                                               | 640                                                                               |                                                                                   | 305                                                                               | 645                                                                               | 548                                                                               |                                                                                    | 637                                                                                 |                                                                                     | 488                                                                                 | 695                                                                                 | 590                                                                                 |
| v/s Ratio Prot                    |                                                                                   | 0.21                                                                              |                                                                                   |                                                                                   | c0.26                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.19                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.07                                                                              |                                                                                   |                                                                                   | 0.13                                                                              |                                                                                   | 0.03                                                                              |                                                                                    | 0.05                                                                                |                                                                                     | 0.07                                                                                |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.18                                                                              | 0.58                                                                              |                                                                                   | 0.37                                                                              | 0.73                                                                              | 0.09                                                                              |                                                                                    | 0.12                                                                                |                                                                                     | 0.19                                                                                | 0.50                                                                                | 0.07                                                                                |
| Uniform Delay, d1                 | 10.3                                                                              | 12.2                                                                              |                                                                                   | 11.1                                                                              | 13.1                                                                              | 10.0                                                                              |                                                                                    | 9.3                                                                                 |                                                                                     | 9.5                                                                                 | 10.9                                                                                | 9.1                                                                                 |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 0.4                                                                               | 1.4                                                                               |                                                                                   | 0.8                                                                               | 4.1                                                                               | 0.1                                                                               |                                                                                    | 0.4                                                                                 |                                                                                     | 0.9                                                                                 | 2.5                                                                                 | 0.2                                                                                 |
| Delay (s)                         | 10.7                                                                              | 13.6                                                                              |                                                                                   | 11.9                                                                              | 17.2                                                                              | 10.1                                                                              |                                                                                    | 9.6                                                                                 |                                                                                     | 10.4                                                                                | 13.5                                                                                | 9.3                                                                                 |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                    | A                                                                                   |                                                                                     | B                                                                                   | B                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 13.3                                                                              |                                                                                   |                                                                                   | 15.0                                                                              |                                                                                   |                                                                                    | 9.6                                                                                 |                                                                                     |                                                                                     | 12.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.5                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 46.9                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.1%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 14                                                                                | 397                                                                               | 0                                                                                 | 0                                                                                 | 719                                                                               | 33                                                                                | 37                                                                                 | 588                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 14                                                                                | 397                                                                               | 0                                                                                 | 0                                                                                 | 719                                                                               | 33                                                                                | 37                                                                                 | 588                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1790                                                                              |                                                                                   |                                                                                    | 1795                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.10                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 184                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1790                                                                              |                                                                                   |                                                                                    | 1795                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 14                                                                                | 397                                                                               | 0                                                                                 | 0                                                                                 | 719                                                                               | 33                                                                                | 37                                                                                 | 588                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 21                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 14                                                                                | 397                                                                               | 0                                                                                 | 0                                                                                 | 750                                                                               | 0                                                                                 | 0                                                                                  | 625                                                                                 | 31                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 39.2                                                                              | 39.2                                                                              |                                                                                   |                                                                                   | 39.2                                                                              |                                                                                   |                                                                                    | 37.1                                                                                | 37.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 39.2                                                                              | 39.2                                                                              |                                                                                   |                                                                                   | 39.2                                                                              |                                                                                   |                                                                                    | 37.1                                                                                | 37.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.44                                                                              | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    | 0.42                                                                                | 0.42                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 81                                                                                | 799                                                                               |                                                                                   |                                                                                   | 794                                                                               |                                                                                   |                                                                                    | 754                                                                                 | 643                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                   | c0.42                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.35                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.17                                                                              | 0.50                                                                              |                                                                                   |                                                                                   | 0.95                                                                              |                                                                                   |                                                                                    | 0.83                                                                                | 0.05                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 14.8                                                                              | 17.5                                                                              |                                                                                   |                                                                                   | 23.5                                                                              |                                                                                   |                                                                                    | 22.8                                                                                | 15.2                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 1.0                                                                               | 0.5                                                                               |                                                                                   |                                                                                   | 19.6                                                                              |                                                                                   |                                                                                    | 10.2                                                                                | 0.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 15.8                                                                              | 18.0                                                                              |                                                                                   |                                                                                   | 43.2                                                                              |                                                                                   |                                                                                    | 33.0                                                                                | 15.3                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 17.9                                                                              |                                                                                   |                                                                                   | 43.2                                                                              |                                                                                   |                                                                                    | 31.6                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 33.3                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.3                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 82.8%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 10                                                                                | 491                                                                               | 4                                                                                 | 58                                                                                | 603                                                                               | 33                                                                                | 26                                                                                  | 190                                                                                 | 53                                                                                  | 103                                                                                 | 214                                                                                 | 20                                                                                  |
| Future Volume (vph)               | 10                                                                                | 491                                                                               | 4                                                                                 | 58                                                                                | 603                                                                               | 33                                                                                | 26                                                                                  | 190                                                                                 | 53                                                                                  | 103                                                                                 | 214                                                                                 | 20                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                     | 0.97                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1798                                                                              |                                                                                   | 1711                                                                              | 1787                                                                              |                                                                                   |                                                                                     | 1744                                                                                |                                                                                     |                                                                                     | 1759                                                                                |                                                                                     |
| Flt Permitted                     | 0.21                                                                              | 1.00                                                                              |                                                                                   | 0.35                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 0.94                                                                                |                                                                                     |                                                                                     | 0.82                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 372                                                                               | 1798                                                                              |                                                                                   | 627                                                                               | 1787                                                                              |                                                                                   |                                                                                     | 1653                                                                                |                                                                                     |                                                                                     | 1466                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 10                                                                                | 491                                                                               | 4                                                                                 | 58                                                                                | 603                                                                               | 33                                                                                | 26                                                                                  | 190                                                                                 | 53                                                                                  | 103                                                                                 | 214                                                                                 | 20                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                   | 14                                                                                  | 0                                                                                   | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 10                                                                                | 494                                                                               | 0                                                                                 | 58                                                                                | 632                                                                               | 0                                                                                 | 0                                                                                   | 255                                                                                 | 0                                                                                   | 0                                                                                   | 333                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 23.6                                                                              | 23.6                                                                              |                                                                                   | 23.6                                                                              | 23.6                                                                              |                                                                                   |                                                                                     | 21.1                                                                                |                                                                                     |                                                                                     | 21.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 23.6                                                                              | 23.6                                                                              |                                                                                   | 23.6                                                                              | 23.6                                                                              |                                                                                   |                                                                                     | 21.1                                                                                |                                                                                     |                                                                                     | 21.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.42                                                                              | 0.42                                                                              |                                                                                   | 0.42                                                                              | 0.42                                                                              |                                                                                   |                                                                                     | 0.37                                                                                |                                                                                     |                                                                                     | 0.37                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 154                                                                               | 748                                                                               |                                                                                   | 260                                                                               | 743                                                                               |                                                                                   |                                                                                     | 615                                                                                 |                                                                                     |                                                                                     | 545                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                   | c0.35                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.03                                                                              |                                                                                   |                                                                                   | 0.09                                                                              |                                                                                   |                                                                                   |                                                                                     | 0.15                                                                                |                                                                                     |                                                                                     | c0.23                                                                               |                                                                                     |
| v/c Ratio                         | 0.06                                                                              | 0.66                                                                              |                                                                                   | 0.22                                                                              | 0.85                                                                              |                                                                                   |                                                                                     | 0.41                                                                                |                                                                                     |                                                                                     | 0.61                                                                                |                                                                                     |
| Uniform Delay, d1                 | 9.9                                                                               | 13.3                                                                              |                                                                                   | 10.7                                                                              | 15.0                                                                              |                                                                                   |                                                                                     | 13.2                                                                                |                                                                                     |                                                                                     | 14.5                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.2                                                                               | 2.2                                                                               |                                                                                   | 0.4                                                                               | 9.3                                                                               |                                                                                   |                                                                                     | 2.1                                                                                 |                                                                                     |                                                                                     | 5.1                                                                                 |                                                                                     |
| Delay (s)                         | 10.1                                                                              | 15.5                                                                              |                                                                                   | 11.1                                                                              | 24.2                                                                              |                                                                                   |                                                                                     | 15.3                                                                                |                                                                                     |                                                                                     | 19.5                                                                                |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 15.4                                                                              |                                                                                   |                                                                                   | 23.1                                                                              |                                                                                   |                                                                                     | 15.3                                                                                |                                                                                     |                                                                                     | 19.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 19.1                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.74                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 56.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 90.7%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT   | WBR  | NBL                       | NBT   | NBR  | SBL   | SBT  | SBR  |
|-----------------------------------|------|------|-------|------|-------|------|---------------------------|-------|------|-------|------|------|
| Lane Configurations               |      | ↑↑   |       | ↑    | ↑     | ↑    |                           | ↑     | ↑    | ↑↑    | ↑    |      |
| Traffic Volume (vph)              | 0    | 684  | 4     | 231  | 938   | 627  | 0                         | 87    | 185  | 247   | 75   | 48   |
| Future Volume (vph)               | 0    | 684  | 4     | 231  | 938   | 627  | 0                         | 87    | 185  | 247   | 75   | 48   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900 | 1900  | 1900 | 1900                      | 1900  | 1900 | 1900  | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Lane Util. Factor                 |      | 0.95 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.97  | 1.00 |      |
| Frt                               |      | 1.00 |       | 1.00 | 1.00  | 0.85 |                           | 1.00  | 0.85 | 1.00  | 0.94 |      |
| Flt Protected                     |      | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (prot)                 |      | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1695 |      |
| Flt Permitted                     |      | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (perm)                 |      | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1695 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00 | 1.00  | 1.00 | 1.00                      | 1.00  | 1.00 | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 684  | 4     | 231  | 938   | 627  | 0                         | 87    | 185  | 247   | 75   | 48   |
| RTOR Reduction (vph)              | 0    | 1    | 0     | 0    | 0     | 0    | 0                         | 0     | 164  | 0     | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 687  | 0     | 231  | 938   | 627  | 0                         | 87    | 21   | 247   | 123  | 0    |
| Turn Type                         |      | NA   |       | Prot | NA    | Prot |                           | NA    | Perm | Prot  | NA   |      |
| Protected Phases                  |      | 4    |       | 3    | 8     | 8    |                           | 2     |      | 1     | 6    |      |
| Permitted Phases                  |      |      |       |      |       |      |                           |       | 2    |       |      |      |
| Actuated Green, G (s)             |      | 26.6 |       | 14.5 | 47.1  | 47.1 |                           | 9.4   | 9.4  | 7.0   | 22.4 |      |
| Effective Green, g (s)            |      | 26.6 |       | 14.5 | 47.1  | 47.1 |                           | 9.4   | 9.4  | 7.0   | 22.4 |      |
| Actuated g/C Ratio                |      | 0.33 |       | 0.18 | 0.58  | 0.58 |                           | 0.12  | 0.12 | 0.09  | 0.27 |      |
| Clearance Time (s)                |      | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  |       | 3.0  | 3.0   | 3.0  |                           | 3.0   | 3.0  | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)                |      | 1115 |       | 304  | 1040  | 884  |                           | 207   | 176  | 285   | 465  |      |
| v/s Ratio Prot                    |      | 0.20 |       | 0.14 | c0.52 | 0.41 |                           | c0.05 |      | c0.07 | 0.07 |      |
| v/s Ratio Perm                    |      |      |       |      |       |      |                           |       | 0.01 |       |      |      |
| v/c Ratio                         |      | 0.62 |       | 0.76 | 0.90  | 0.71 |                           | 0.42  | 0.12 | 0.87  | 0.26 |      |
| Uniform Delay, d1                 |      | 23.1 |       | 31.8 | 15.2  | 12.3 |                           | 33.5  | 32.3 | 36.8  | 23.1 |      |
| Progression Factor                |      | 1.00 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 1.00  | 1.00 |      |
| Incremental Delay, d2             |      | 2.6  |       | 10.4 | 12.4  | 4.8  |                           | 1.4   | 0.3  | 23.0  | 0.3  |      |
| Delay (s)                         |      | 25.7 |       | 42.3 | 27.6  | 17.1 |                           | 34.9  | 32.7 | 59.8  | 23.4 |      |
| Level of Service                  |      | C    |       | D    | C     | B    |                           | C     | C    | E     | C    |      |
| Approach Delay (s)                |      | 25.7 |       |      | 25.8  |      |                           | 33.4  |      |       | 47.7 |      |
| Approach LOS                      |      | C    |       |      | C     |      |                           | C     |      |       | D    |      |
| <b>Intersection Summary</b>       |      |      |       |      |       |      |                           |       |      |       |      |      |
| HCM 2000 Control Delay            |      |      | 29.0  |      |       |      | HCM 2000 Level of Service |       |      | C     |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.91  |      |       |      |                           |       |      |       |      |      |
| Actuated Cycle Length (s)         |      |      | 81.5  |      |       |      | Sum of lost time (s)      |       |      | 24.0  |      |      |
| Intersection Capacity Utilization |      |      | 73.1% |      |       |      | ICU Level of Service      |       |      | D     |      |      |
| Analysis Period (min)             |      |      | 15    |      |       |      |                           |       |      |       |      |      |
| c Critical Lane Group             |      |      |       |      |       |      |                           |       |      |       |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |                                                                                   |                                                                                   |                                                                                                                                                                        |                           |                                                                                                                                                                        |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                                                                                                                    | SBL                       | SBT                                                                                                                                                                    |
| Lane Configurations               |  |  |  | <br> |                           | <br> |
| Traffic Volume (vph)              | 156                                                                               | 171                                                                               | 834                                                                               | 501                                                                                                                                                                    | 154                       | 617                                                                                                                                                                    |
| Future Volume (vph)               | 156                                                                               | 171                                                                               | 834                                                                               | 501                                                                                                                                                                    | 154                       | 617                                                                                                                                                                    |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                                                                                                   | 1900                      | 1900                                                                                                                                                                   |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                                                                                                                    |                           | 6.0                                                                                                                                                                    |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                                                                                                                   |                           | 0.95                                                                                                                                                                   |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                                                                                                                   |                           | 1.00                                                                                                                                                                   |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                                                                                                   |                           | 0.99                                                                                                                                                                   |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                                                                                                                   |                           | 3387                                                                                                                                                                   |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                                                                                                   |                           | 0.57                                                                                                                                                                   |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                                                                                                                   |                           | 1948                                                                                                                                                                   |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                                                                                                   | 1.00                      | 1.00                                                                                                                                                                   |
| Adj. Flow (vph)                   | 156                                                                               | 171                                                                               | 834                                                                               | 501                                                                                                                                                                    | 154                       | 617                                                                                                                                                                    |
| RTOR Reduction (vph)              | 0                                                                                 | 98                                                                                | 0                                                                                 | 203                                                                                                                                                                    | 0                         | 0                                                                                                                                                                      |
| Lane Group Flow (vph)             | 156                                                                               | 73                                                                                | 834                                                                               | 298                                                                                                                                                                    | 0                         | 771                                                                                                                                                                    |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                                                                                                                   | Perm                      | NA                                                                                                                                                                     |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                                                                                                        |                           | 6                                                                                                                                                                      |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                                                                                                      | 6                         |                                                                                                                                                                        |
| Actuated Green, G (s)             | 10.3                                                                              | 10.3                                                                              | 32.8                                                                              | 32.8                                                                                                                                                                   |                           | 32.8                                                                                                                                                                   |
| Effective Green, g (s)            | 10.3                                                                              | 10.3                                                                              | 32.8                                                                              | 32.8                                                                                                                                                                   |                           | 32.8                                                                                                                                                                   |
| Actuated g/C Ratio                | 0.19                                                                              | 0.19                                                                              | 0.60                                                                              | 0.60                                                                                                                                                                   |                           | 0.60                                                                                                                                                                   |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                                                                                                                    |                           | 6.0                                                                                                                                                                    |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                                                                                                    |                           | 3.0                                                                                                                                                                    |
| Lane Grp Cap (vph)                | 319                                                                               | 286                                                                               | 1072                                                                              | 1603                                                                                                                                                                   |                           | 1159                                                                                                                                                                   |
| v/s Ratio Prot                    | c0.09                                                                             |                                                                                   | c0.46                                                                             |                                                                                                                                                                        |                           |                                                                                                                                                                        |
| v/s Ratio Perm                    |                                                                                   | 0.05                                                                              |                                                                                   | 0.11                                                                                                                                                                   |                           | 0.40                                                                                                                                                                   |
| v/c Ratio                         | 0.49                                                                              | 0.26                                                                              | 0.78                                                                              | 0.19                                                                                                                                                                   |                           | 0.67                                                                                                                                                                   |
| Uniform Delay, d1                 | 20.0                                                                              | 19.1                                                                              | 8.4                                                                               | 5.1                                                                                                                                                                    |                           | 7.5                                                                                                                                                                    |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                                                                                                   |                           | 1.00                                                                                                                                                                   |
| Incremental Delay, d2             | 1.2                                                                               | 0.5                                                                               | 5.6                                                                               | 0.3                                                                                                                                                                    |                           | 3.0                                                                                                                                                                    |
| Delay (s)                         | 21.2                                                                              | 19.6                                                                              | 14.0                                                                              | 5.3                                                                                                                                                                    |                           | 10.5                                                                                                                                                                   |
| Level of Service                  | C                                                                                 | B                                                                                 | B                                                                                 | A                                                                                                                                                                      |                           | B                                                                                                                                                                      |
| Approach Delay (s)                | 20.4                                                                              |                                                                                   | 10.7                                                                              |                                                                                                                                                                        |                           | 10.5                                                                                                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   | B                                                                                 |                                                                                                                                                                        |                           | B                                                                                                                                                                      |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |                           |                                                                                                                                                                        |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 12.0                                                                              |                                                                                                                                                                        | HCM 2000 Level of Service | B                                                                                                                                                                      |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                                                                                                        |                           |                                                                                                                                                                        |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 55.1                                                                              |                                                                                                                                                                        | Sum of lost time (s)      | 12.0                                                                                                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 89.1%                                                                             |                                                                                                                                                                        | ICU Level of Service      | E                                                                                                                                                                      |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                                                                                                        |                           |                                                                                                                                                                        |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |                           |                                                                                                                                                                        |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   | →    | ↘    | ↙     | ←     | ↖                         | ↗    |
|-----------------------------------|------|------|-------|-------|---------------------------|------|
| Movement                          | EBT  | EBR  | WBL   | WBT   | NBL                       | NBR  |
| Lane Configurations               | ↰    |      |       | ↱     | ↰                         | ↱    |
| Traffic Volume (vph)              | 434  | 18   | 39    | 476   | 46                        | 101  |
| Future Volume (vph)               | 434  | 18   | 39    | 476   | 46                        | 101  |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900                      | 1900 |
| Total Lost time (s)               | 6.0  |      |       | 6.0   | 6.0                       |      |
| Lane Util. Factor                 | 1.00 |      |       | 1.00  | 1.00                      |      |
| Frt                               | 0.99 |      |       | 1.00  | 0.91                      |      |
| Flt Protected                     | 1.00 |      |       | 1.00  | 0.98                      |      |
| Satd. Flow (prot)                 | 1791 |      |       | 1794  | 1608                      |      |
| Flt Permitted                     | 1.00 |      |       | 0.93  | 0.98                      |      |
| Satd. Flow (perm)                 | 1791 |      |       | 1679  | 1608                      |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00  | 1.00                      | 1.00 |
| Adj. Flow (vph)                   | 434  | 18   | 39    | 476   | 46                        | 101  |
| RTOR Reduction (vph)              | 3    | 0    | 0     | 0     | 63                        | 0    |
| Lane Group Flow (vph)             | 449  | 0    | 0     | 515   | 84                        | 0    |
| Turn Type                         | NA   |      | Perm  | NA    | Prot                      |      |
| Protected Phases                  | 4    |      |       | 8     | 2                         |      |
| Permitted Phases                  |      |      | 8     |       |                           |      |
| Actuated Green, G (s)             | 17.7 |      |       | 17.7  | 18.1                      |      |
| Effective Green, g (s)            | 17.7 |      |       | 17.7  | 18.1                      |      |
| Actuated g/C Ratio                | 0.37 |      |       | 0.37  | 0.38                      |      |
| Clearance Time (s)                | 6.0  |      |       | 6.0   | 6.0                       |      |
| Vehicle Extension (s)             | 3.0  |      |       | 3.0   | 3.0                       |      |
| Lane Grp Cap (vph)                | 663  |      |       | 621   | 608                       |      |
| v/s Ratio Prot                    | 0.25 |      |       |       | c0.05                     |      |
| v/s Ratio Perm                    |      |      |       | c0.31 |                           |      |
| v/c Ratio                         | 0.68 |      |       | 0.83  | 0.14                      |      |
| Uniform Delay, d1                 | 12.6 |      |       | 13.7  | 9.7                       |      |
| Progression Factor                | 1.00 |      |       | 1.00  | 1.00                      |      |
| Incremental Delay, d2             | 2.7  |      |       | 9.0   | 0.5                       |      |
| Delay (s)                         | 15.4 |      |       | 22.7  | 10.2                      |      |
| Level of Service                  | B    |      |       | C     | B                         |      |
| Approach Delay (s)                | 15.4 |      |       | 22.7  | 10.2                      |      |
| Approach LOS                      | B    |      |       | C     | B                         |      |
| <b>Intersection Summary</b>       |      |      |       |       |                           |      |
| HCM 2000 Control Delay            |      |      | 18.1  |       | HCM 2000 Level of Service | B    |
| HCM 2000 Volume to Capacity ratio |      |      | 0.48  |       |                           |      |
| Actuated Cycle Length (s)         |      |      | 47.8  |       | Sum of lost time (s)      | 12.0 |
| Intersection Capacity Utilization |      |      | 74.9% |       | ICU Level of Service      | D    |
| Analysis Period (min)             |      |      | 15    |       |                           |      |
| c Critical Lane Group             |      |      |       |       |                           |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT   | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|-------|------|-------|---------------------------|-------|------|------|------|------|------|
| Lane Configurations               |      | ↑    | ↑     | ↑    | ↑     |                           | ↑     |      | ↑    | ↑    | ↑↓   | ↑    |
| Traffic Volume (vph)              | 0    | 331  | 118   | 196  | 430   | 0                         | 201   | 0    | 308  | 107  | 304  | 51   |
| Future Volume (vph)               | 0    | 331  | 118   | 196  | 430   | 0                         | 201   | 0    | 308  | 107  | 304  | 51   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900 | 1900  | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0  | 6.0   | 6.0  | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Lane Util. Factor                 |      | 1.00 | 1.00  | 1.00 | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 0.95 |      |
| Frt                               |      | 1.00 | 0.85  | 1.00 | 1.00  |                           | 1.00  |      | 0.85 | 1.00 | 0.98 |      |
| Flt Protected                     |      | 1.00 | 1.00  | 0.95 | 1.00  |                           | 0.95  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (prot)                 |      | 1801 | 1531  | 1711 | 1801  |                           | 1711  |      | 1531 | 1711 | 3348 |      |
| Flt Permitted                     |      | 1.00 | 1.00  | 0.52 | 1.00  |                           | 0.54  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (perm)                 |      | 1801 | 1531  | 930  | 1801  |                           | 971   |      | 1531 | 1711 | 3348 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00 | 1.00  | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 331  | 118   | 196  | 430   | 0                         | 201   | 0    | 308  | 107  | 304  | 51   |
| RTOR Reduction (vph)              | 0    | 0    | 0     | 0    | 0     | 0                         | 0     | 0    | 178  | 0    | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 331  | 118   | 196  | 430   | 0                         | 201   | 0    | 130  | 107  | 355  | 0    |
| Turn Type                         |      | NA   | Perm  | Perm | NA    |                           | Perm  |      | Perm | Perm | NA   |      |
| Protected Phases                  |      | 4    |       |      | 8     |                           |       |      |      |      | 6    |      |
| Permitted Phases                  |      |      | 4     | 8    |       |                           | 2     |      | 2    | 6    |      |      |
| Actuated Green, G (s)             |      | 15.5 | 15.5  | 15.5 | 15.5  |                           | 20.1  |      | 20.1 | 20.1 | 20.1 |      |
| Effective Green, g (s)            |      | 15.5 | 15.5  | 15.5 | 15.5  |                           | 20.1  |      | 20.1 | 20.1 | 20.1 |      |
| Actuated g/C Ratio                |      | 0.33 | 0.33  | 0.33 | 0.33  |                           | 0.42  |      | 0.42 | 0.42 | 0.42 |      |
| Clearance Time (s)                |      | 6.0  | 6.0   | 6.0  | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  | 3.0   | 3.0  | 3.0   |                           | 3.0   |      | 3.0  | 3.0  | 3.0  |      |
| Lane Grp Cap (vph)                |      | 586  | 498   | 302  | 586   |                           | 410   |      | 646  | 722  | 1413 |      |
| v/s Ratio Prot                    |      | 0.18 |       |      | c0.24 |                           |       |      |      |      | 0.11 |      |
| v/s Ratio Perm                    |      |      | 0.08  | 0.21 |       |                           | c0.21 |      | 0.08 | 0.06 |      |      |
| v/c Ratio                         |      | 0.56 | 0.24  | 0.65 | 0.73  |                           | 0.49  |      | 0.20 | 0.15 | 0.25 |      |
| Uniform Delay, d1                 |      | 13.3 | 11.7  | 13.7 | 14.2  |                           | 10.0  |      | 8.7  | 8.5  | 8.9  |      |
| Progression Factor                |      | 1.00 | 1.00  | 1.00 | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 1.00 |      |
| Incremental Delay, d2             |      | 1.3  | 0.2   | 4.8  | 4.7   |                           | 4.1   |      | 0.7  | 0.4  | 0.4  |      |
| Delay (s)                         |      | 14.5 | 12.0  | 18.5 | 19.0  |                           | 14.2  |      | 9.4  | 8.9  | 9.3  |      |
| Level of Service                  |      | B    | B     | B    | B     |                           | B     |      | A    | A    | A    |      |
| Approach Delay (s)                |      | 13.8 |       |      | 18.8  |                           |       | 11.3 |      |      | 9.2  |      |
| Approach LOS                      |      | B    |       |      | B     |                           |       | B    |      |      | A    |      |
| <b>Intersection Summary</b>       |      |      |       |      |       |                           |       |      |      |      |      |      |
| HCM 2000 Control Delay            |      |      | 13.7  |      |       | HCM 2000 Level of Service |       |      | B    |      |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.60  |      |       |                           |       |      |      |      |      |      |
| Actuated Cycle Length (s)         |      |      | 47.6  |      |       | Sum of lost time (s)      |       |      | 12.0 |      |      |      |
| Intersection Capacity Utilization |      |      | 67.8% |      |       | ICU Level of Service      |       |      | C    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |       |                           |       |      |      |      |      |      |
| c Critical Lane Group             |      |      |       |      |       |                           |       |      |      |      |      |      |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 168                                                                               | 527                                                                               | 0                                                                                 | 0                                                                                 | 542                                                                               | 65                                                                                | 52                                                                                  | 311                                                                                 | 56                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 168                                                                               | 527                                                                               | 0                                                                                 | 0                                                                                 | 542                                                                               | 65                                                                                | 52                                                                                  | 311                                                                                 | 56                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                                | 0.98                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1775                                                                              |                                                                                   | 1711                                                                                | 1759                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.25                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 445                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1775                                                                              |                                                                                   | 1711                                                                                | 1759                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 168                                                                               | 527                                                                               | 0                                                                                 | 0                                                                                 | 542                                                                               | 65                                                                                | 52                                                                                  | 311                                                                                 | 56                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                   | 10                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 168                                                                               | 527                                                                               | 0                                                                                 | 0                                                                                 | 599                                                                               | 0                                                                                 | 52                                                                                  | 357                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 22.9                                                                              | 22.9                                                                              |                                                                                   |                                                                                   | 22.9                                                                              |                                                                                   | 19.2                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 22.9                                                                              | 22.9                                                                              |                                                                                   |                                                                                   | 22.9                                                                              |                                                                                   | 19.2                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.42                                                                              | 0.42                                                                              |                                                                                   |                                                                                   | 0.42                                                                              |                                                                                   | 0.35                                                                                | 0.35                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 188                                                                               | 762                                                                               |                                                                                   |                                                                                   | 751                                                                               |                                                                                   | 607                                                                                 | 624                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.29                                                                              |                                                                                   |                                                                                   | 0.34                                                                              |                                                                                   |                                                                                     | c0.20                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | c0.38                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.03                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.89                                                                              | 0.69                                                                              |                                                                                   |                                                                                   | 0.80                                                                              |                                                                                   | 0.09                                                                                | 0.57                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 14.5                                                                              | 12.7                                                                              |                                                                                   |                                                                                   | 13.6                                                                              |                                                                                   | 11.6                                                                                | 14.1                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 37.3                                                                              | 2.7                                                                               |                                                                                   |                                                                                   | 5.9                                                                               |                                                                                   | 0.3                                                                                 | 3.8                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 51.7                                                                              | 15.4                                                                              |                                                                                   |                                                                                   | 19.5                                                                              |                                                                                   | 11.9                                                                                | 17.9                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | D                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                   | 19.5                                                                              |                                                                                   |                                                                                     | 17.2                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 20.8                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.75                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 54.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 76.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 48                                                                                | 523                                                                               | 44                                                                                | 60                                                                                | 522                                                                               | 47                                                                                | 65                                                                                 | 271                                                                                 | 59                                                                                  | 29                                                                                  | 194                                                                                 | 39                                                                                  |
| Future Volume (vph)               | 48                                                                                | 523                                                                               | 44                                                                                | 60                                                                                | 522                                                                               | 47                                                                                | 65                                                                                 | 271                                                                                 | 59                                                                                  | 29                                                                                  | 194                                                                                 | 39                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1776                                                                              |                                                                                   | 1711                                                                              | 1778                                                                              |                                                                                   |                                                                                    | 1750                                                                                |                                                                                     |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.93                                                                              |                                                                                   | 0.39                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.90                                                                                |                                                                                     |                                                                                     | 0.93                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1650                                                                              |                                                                                   | 706                                                                               | 1778                                                                              |                                                                                   |                                                                                    | 1587                                                                                |                                                                                     |                                                                                     | 1636                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 48                                                                                | 523                                                                               | 44                                                                                | 60                                                                                | 522                                                                               | 47                                                                                | 65                                                                                 | 271                                                                                 | 59                                                                                  | 29                                                                                  | 194                                                                                 | 39                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                  | 11                                                                                  | 0                                                                                   | 0                                                                                   | 11                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 610                                                                               | 0                                                                                 | 60                                                                                | 564                                                                               | 0                                                                                 | 0                                                                                  | 384                                                                                 | 0                                                                                   | 0                                                                                   | 251                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 28.1                                                                              |                                                                                   | 28.1                                                                              | 28.1                                                                              |                                                                                   |                                                                                    | 17.2                                                                                |                                                                                     |                                                                                     | 17.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 28.1                                                                              |                                                                                   | 28.1                                                                              | 28.1                                                                              |                                                                                   |                                                                                    | 17.2                                                                                |                                                                                     |                                                                                     | 17.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.49                                                                              |                                                                                   | 0.49                                                                              | 0.49                                                                              |                                                                                   |                                                                                    | 0.30                                                                                |                                                                                     |                                                                                     | 0.30                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 809                                                                               |                                                                                   | 346                                                                               | 871                                                                               |                                                                                   |                                                                                    | 476                                                                                 |                                                                                     |                                                                                     | 491                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.32                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.37                                                                             |                                                                                   | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.24                                                                               |                                                                                     |                                                                                     | 0.15                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.75                                                                              |                                                                                   | 0.17                                                                              | 0.65                                                                              |                                                                                   |                                                                                    | 0.81                                                                                |                                                                                     |                                                                                     | 0.51                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.8                                                                              |                                                                                   | 8.1                                                                               | 10.9                                                                              |                                                                                   |                                                                                    | 18.5                                                                                |                                                                                     |                                                                                     | 16.6                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 6.5                                                                               |                                                                                   | 1.1                                                                               | 3.7                                                                               |                                                                                   |                                                                                    | 9.6                                                                                 |                                                                                     |                                                                                     | 0.9                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 18.3                                                                              |                                                                                   | 9.2                                                                               | 14.6                                                                              |                                                                                   |                                                                                    | 28.2                                                                                |                                                                                     |                                                                                     | 17.5                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 18.3                                                                              |                                                                                   |                                                                                   | 14.1                                                                              |                                                                                   |                                                                                    | 28.2                                                                                |                                                                                     |                                                                                     | 17.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 18.8                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.77                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 57.3                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 110.8%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |  |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 504                                                                               | 58                                                                                | 151                                                                               | 589                                                                               | 92                                                                                | 155                                                                                 | 260                                                                                 | 193                                                                                 | 27                                                                                  | 118                                                                                 | 12                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 504                                                                               | 58                                                                                | 151                                                                               | 589                                                                               | 92                                                                                | 155                                                                                 | 260                                                                                 | 193                                                                                 | 27                                                                                  | 118                                                                                 | 12                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.98                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1776                                                                              |                                                                                   | 1711                                                                              | 1764                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1767                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   | 0.20                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1758                                                                              |                                                                                   | 354                                                                               | 1764                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1767                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 504                                                                               | 58                                                                                | 151                                                                               | 589                                                                               | 92                                                                                | 155                                                                                 | 260                                                                                 | 193                                                                                 | 27                                                                                  | 118                                                                                 | 12                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 157                                                                                 | 0                                                                                   | 3                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 558                                                                               | 0                                                                                 | 151                                                                               | 681                                                                               | 0                                                                                 | 155                                                                                 | 260                                                                                 | 36                                                                                  | 0                                                                                   | 154                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     | Split                                                                               | NA                                                                                  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   | 6                                                                                   |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 30.1                                                                              |                                                                                   | 41.2                                                                              | 41.2                                                                              |                                                                                   | 16.4                                                                                | 16.4                                                                                | 16.4                                                                                |                                                                                     | 12.8                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 30.1                                                                              |                                                                                   | 41.2                                                                              | 41.2                                                                              |                                                                                   | 16.4                                                                                | 16.4                                                                                | 16.4                                                                                |                                                                                     | 12.8                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.34                                                                              |                                                                                   | 0.47                                                                              | 0.47                                                                              |                                                                                   | 0.19                                                                                | 0.19                                                                                | 0.19                                                                                |                                                                                     | 0.14                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 604                                                                               |                                                                                   | 243                                                                               | 822                                                                               |                                                                                   | 317                                                                                 | 334                                                                                 | 284                                                                                 |                                                                                     | 255                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.31                                                                              |                                                                                   | 0.04                                                                              | c0.39                                                                             |                                                                                   | 0.09                                                                                | c0.14                                                                               |                                                                                     |                                                                                     | c0.09                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.25                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.92                                                                              |                                                                                   | 0.62                                                                              | 0.83                                                                              |                                                                                   | 0.49                                                                                | 0.78                                                                                | 0.13                                                                                |                                                                                     | 0.60                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 28.0                                                                              |                                                                                   | 31.8                                                                              | 20.5                                                                              |                                                                                   | 32.2                                                                                | 34.3                                                                                | 30.0                                                                                |                                                                                     | 35.4                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 22.0                                                                              |                                                                                   | 4.9                                                                               | 9.4                                                                               |                                                                                   | 1.2                                                                                 | 10.9                                                                                | 0.2                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 50.1                                                                              |                                                                                   | 36.6                                                                              | 30.0                                                                              |                                                                                   | 33.4                                                                                | 45.2                                                                                | 30.2                                                                                |                                                                                     | 39.4                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 |                                                                                   | D                                                                                 | C                                                                                 |                                                                                   | C                                                                                   | D                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 50.1                                                                              |                                                                                   |                                                                                   | 31.2                                                                              |                                                                                   |                                                                                     | 37.4                                                                                |                                                                                     |                                                                                     | 39.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 38.4                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 108.7%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 16                                                                                | 372                                                                               | 90                                                                                | 78                                                                                | 467                                                                               | 61                                                                                | 59                                                                                 | 88                                                                                  | 58                                                                                  | 110                                                                                 | 193                                                                                 | 23                                                                                  |
| Future Volume (vph)               | 16                                                                                | 372                                                                               | 90                                                                                | 78                                                                                | 467                                                                               | 61                                                                                | 59                                                                                 | 88                                                                                  | 58                                                                                  | 110                                                                                 | 193                                                                                 | 23                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1752                                                                              |                                                                                   |                                                                                   | 1765                                                                              |                                                                                   |                                                                                    | 1765                                                                                | 1531                                                                                |                                                                                     | 1754                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                    | 0.79                                                                                | 1.00                                                                                |                                                                                     | 0.83                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1708                                                                              |                                                                                   |                                                                                   | 1582                                                                              |                                                                                   |                                                                                    | 1422                                                                                | 1531                                                                                |                                                                                     | 1480                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 16                                                                                | 372                                                                               | 90                                                                                | 78                                                                                | 467                                                                               | 61                                                                                | 59                                                                                 | 88                                                                                  | 58                                                                                  | 110                                                                                 | 193                                                                                 | 23                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 38                                                                                  | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 463                                                                               | 0                                                                                 | 0                                                                                 | 599                                                                               | 0                                                                                 | 0                                                                                  | 147                                                                                 | 20                                                                                  | 0                                                                                   | 321                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 24.9                                                                              |                                                                                   |                                                                                   | 24.9                                                                              |                                                                                   |                                                                                    | 19.2                                                                                | 19.2                                                                                |                                                                                     | 19.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 24.9                                                                              |                                                                                   |                                                                                   | 24.9                                                                              |                                                                                   |                                                                                    | 19.2                                                                                | 19.2                                                                                |                                                                                     | 19.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    | 0.34                                                                                | 0.34                                                                                |                                                                                     | 0.34                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 758                                                                               |                                                                                   |                                                                                   | 702                                                                               |                                                                                   |                                                                                    | 486                                                                                 | 523                                                                                 |                                                                                     | 506                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                    | 0.10                                                                                | 0.01                                                                                |                                                                                     | 0.22                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |                                                                                    | 0.30                                                                                | 0.04                                                                                |                                                                                     | 0.64                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.9                                                                              |                                                                                   |                                                                                   | 14.0                                                                              |                                                                                   |                                                                                    | 13.5                                                                                | 12.3                                                                                |                                                                                     | 15.5                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.5                                                                               |                                                                                   |                                                                                   | 9.8                                                                               |                                                                                   |                                                                                    | 1.6                                                                                 | 0.1                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                   | 23.8                                                                              |                                                                                   |                                                                                    | 15.1                                                                                | 12.4                                                                                |                                                                                     | 21.5                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                   | 23.8                                                                              |                                                                                   |                                                                                    | 14.4                                                                                |                                                                                     |                                                                                     | 21.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 19.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.76                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 56.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 97.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 17                                                                                | 458                                                                               | 99                                                                                | 64                                                                                | 462                                                                               | 88                                                                                | 123                                                                                | 88                                                                                  | 75                                                                                  | 75                                                                                  | 126                                                                                 | 9                                                                                   |
| Future Volume (vph)               | 17                                                                                | 458                                                                               | 99                                                                                | 64                                                                                | 462                                                                               | 88                                                                                | 123                                                                                | 88                                                                                  | 75                                                                                  | 75                                                                                  | 126                                                                                 | 9                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 |                                                                                   | 1797                                                                              | 1531                                                                              | 1711                                                                              | 1757                                                                              |                                                                                   |                                                                                    | 1750                                                                                | 1531                                                                                |                                                                                     | 1768                                                                                | 1531                                                                                |
| Flt Permitted                     |                                                                                   | 0.94                                                                              | 1.00                                                                              | 0.36                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.71                                                                                | 1.00                                                                                |                                                                                     | 0.81                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 |                                                                                   | 1701                                                                              | 1531                                                                              | 648                                                                               | 1757                                                                              |                                                                                   |                                                                                    | 1279                                                                                | 1531                                                                                |                                                                                     | 1455                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 17                                                                                | 458                                                                               | 99                                                                                | 64                                                                                | 462                                                                               | 88                                                                                | 123                                                                                | 88                                                                                  | 75                                                                                  | 75                                                                                  | 126                                                                                 | 9                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 62                                                                                | 0                                                                                 | 14                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 47                                                                                  | 0                                                                                   | 0                                                                                   | 6                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 475                                                                               | 37                                                                                | 64                                                                                | 536                                                                               | 0                                                                                 | 0                                                                                  | 211                                                                                 | 28                                                                                  | 0                                                                                   | 201                                                                                 | 3                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             |                                                                                   | 17.9                                                                              | 17.9                                                                              | 17.9                                                                              | 17.9                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                |
| Effective Green, g (s)            |                                                                                   | 17.9                                                                              | 17.9                                                                              | 17.9                                                                              | 17.9                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                |
| Actuated g/C Ratio                |                                                                                   | 0.37                                                                              | 0.37                                                                              | 0.37                                                                              | 0.37                                                                              |                                                                                   |                                                                                    | 0.38                                                                                | 0.38                                                                                |                                                                                     | 0.38                                                                                | 0.38                                                                                |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                |                                                                                   | 634                                                                               | 570                                                                               | 241                                                                               | 655                                                                               |                                                                                   |                                                                                    | 482                                                                                 | 577                                                                                 |                                                                                     | 548                                                                                 | 577                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.30                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.28                                                                              | 0.02                                                                              | 0.10                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.16                                                                               | 0.02                                                                                |                                                                                     | 0.14                                                                                | 0.00                                                                                |
| v/c Ratio                         |                                                                                   | 0.75                                                                              | 0.06                                                                              | 0.27                                                                              | 0.82                                                                              |                                                                                   |                                                                                    | 0.44                                                                                | 0.05                                                                                |                                                                                     | 0.37                                                                                | 0.01                                                                                |
| Uniform Delay, d1                 |                                                                                   | 13.1                                                                              | 9.7                                                                               | 10.5                                                                              | 13.6                                                                              |                                                                                   |                                                                                    | 11.2                                                                                | 9.5                                                                                 |                                                                                     | 10.8                                                                                | 9.3                                                                                 |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             |                                                                                   | 4.8                                                                               | 0.0                                                                               | 0.6                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 2.9                                                                                 | 0.2                                                                                 |                                                                                     | 1.9                                                                                 | 0.0                                                                                 |
| Delay (s)                         |                                                                                   | 17.9                                                                              | 9.7                                                                               | 11.1                                                                              | 21.4                                                                              |                                                                                   |                                                                                    | 14.0                                                                                | 9.6                                                                                 |                                                                                     | 12.7                                                                                | 9.4                                                                                 |
| Level of Service                  |                                                                                   | B                                                                                 | A                                                                                 | B                                                                                 | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | A                                                                                   |                                                                                     | B                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 16.5                                                                              |                                                                                   |                                                                                   | 20.3                                                                              |                                                                                   |                                                                                    | 12.9                                                                                |                                                                                     |                                                                                     | 12.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 16.8                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.63                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 48.0                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 90.4%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 97                                                                                | 515                                                                               | 57                                                                                | 92                                                                                | 575                                                                               | 174                                                                               | 7                                                                                  | 167                                                                                 | 49                                                                                  | 281                                                                                 | 437                                                                                 | 134                                                                                 |
| Future Volume (vph)               | 97                                                                                | 515                                                                               | 57                                                                                | 92                                                                                | 575                                                                               | 174                                                                               | 7                                                                                  | 167                                                                                 | 49                                                                                  | 281                                                                                 | 437                                                                                 | 134                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.97                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1711                                                                              | 1774                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1745                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.25                                                                              | 1.00                                                                              |                                                                                   | 0.25                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 0.68                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 450                                                                               | 1774                                                                              |                                                                                   | 456                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1718                                                                                |                                                                                     | 1221                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 97                                                                                | 515                                                                               | 57                                                                                | 92                                                                                | 575                                                                               | 174                                                                               | 7                                                                                  | 167                                                                                 | 49                                                                                  | 281                                                                                 | 437                                                                                 | 134                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 104                                                                               | 0                                                                                  | 18                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 83                                                                                  |
| Lane Group Flow (vph)             | 97                                                                                | 565                                                                               | 0                                                                                 | 92                                                                                | 575                                                                               | 70                                                                                | 0                                                                                  | 205                                                                                 | 0                                                                                   | 281                                                                                 | 437                                                                                 | 51                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 20.5                                                                              | 20.5                                                                              |                                                                                   | 20.5                                                                              | 20.5                                                                              | 20.5                                                                              |                                                                                    | 20.1                                                                                |                                                                                     | 20.1                                                                                | 20.1                                                                                | 20.1                                                                                |
| Effective Green, g (s)            | 20.5                                                                              | 20.5                                                                              |                                                                                   | 20.5                                                                              | 20.5                                                                              | 20.5                                                                              |                                                                                    | 20.1                                                                                |                                                                                     | 20.1                                                                                | 20.1                                                                                | 20.1                                                                                |
| Actuated g/C Ratio                | 0.39                                                                              | 0.39                                                                              |                                                                                   | 0.39                                                                              | 0.39                                                                              | 0.39                                                                              |                                                                                    | 0.38                                                                                |                                                                                     | 0.38                                                                                | 0.38                                                                                | 0.38                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 175                                                                               | 691                                                                               |                                                                                   | 177                                                                               | 701                                                                               | 596                                                                               |                                                                                    | 656                                                                                 |                                                                                     | 466                                                                                 | 688                                                                                 | 585                                                                                 |
| v/s Ratio Prot                    |                                                                                   | 0.32                                                                              |                                                                                   |                                                                                   | c0.32                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.24                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.22                                                                              |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   | 0.05                                                                              |                                                                                    | 0.12                                                                                |                                                                                     | 0.23                                                                                |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.55                                                                              | 0.82                                                                              |                                                                                   | 0.52                                                                              | 0.82                                                                              | 0.12                                                                              |                                                                                    | 0.31                                                                                |                                                                                     | 0.60                                                                                | 0.64                                                                                | 0.09                                                                                |
| Uniform Delay, d1                 | 12.5                                                                              | 14.4                                                                              |                                                                                   | 12.3                                                                              | 14.4                                                                              | 10.3                                                                              |                                                                                    | 11.4                                                                                |                                                                                     | 13.0                                                                                | 13.3                                                                                | 10.4                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 3.8                                                                               | 7.4                                                                               |                                                                                   | 2.6                                                                               | 7.6                                                                               | 0.1                                                                               |                                                                                    | 1.2                                                                                 |                                                                                     | 5.7                                                                                 | 4.4                                                                                 | 0.3                                                                                 |
| Delay (s)                         | 16.3                                                                              | 21.8                                                                              |                                                                                   | 14.9                                                                              | 22.0                                                                              | 10.4                                                                              |                                                                                    | 12.6                                                                                |                                                                                     | 18.7                                                                                | 17.7                                                                                | 10.7                                                                                |
| Level of Service                  | B                                                                                 | C                                                                                 |                                                                                   | B                                                                                 | C                                                                                 | B                                                                                 |                                                                                    | B                                                                                   |                                                                                     | B                                                                                   | B                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 21.0                                                                              |                                                                                   |                                                                                   | 18.8                                                                              |                                                                                   |                                                                                    | 12.6                                                                                |                                                                                     |                                                                                     | 16.9                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 18.2                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.73                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 52.6                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 90.8%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 43                                                                                | 819                                                                               | 0                                                                                 | 0                                                                                 | 698                                                                               | 38                                                                                | 48                                                                                 | 368                                                                                 | 109                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 43                                                                                | 819                                                                               | 0                                                                                 | 0                                                                                 | 698                                                                               | 38                                                                                | 48                                                                                 | 368                                                                                 | 109                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1788                                                                              |                                                                                   |                                                                                    | 1790                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.19                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 338                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1788                                                                              |                                                                                   |                                                                                    | 1790                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 43                                                                                | 819                                                                               | 0                                                                                 | 0                                                                                 | 698                                                                               | 38                                                                                | 48                                                                                 | 368                                                                                 | 109                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 76                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 43                                                                                | 819                                                                               | 0                                                                                 | 0                                                                                 | 732                                                                               | 0                                                                                 | 0                                                                                  | 416                                                                                 | 33                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 28.7                                                                              | 28.7                                                                              |                                                                                   |                                                                                   | 28.7                                                                              |                                                                                   |                                                                                    | 18.0                                                                                | 18.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 28.7                                                                              | 28.7                                                                              |                                                                                   |                                                                                   | 28.7                                                                              |                                                                                   |                                                                                    | 18.0                                                                                | 18.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.49                                                                              | 0.49                                                                              |                                                                                   |                                                                                   | 0.49                                                                              |                                                                                   |                                                                                    | 0.31                                                                                | 0.31                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 165                                                                               | 880                                                                               |                                                                                   |                                                                                   | 874                                                                               |                                                                                   |                                                                                    | 548                                                                                 | 469                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.45                                                                             |                                                                                   |                                                                                   | 0.41                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.13                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.23                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.26                                                                              | 0.93                                                                              |                                                                                   |                                                                                   | 0.84                                                                              |                                                                                   |                                                                                    | 0.76                                                                                | 0.07                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 8.8                                                                               | 14.1                                                                              |                                                                                   |                                                                                   | 13.0                                                                              |                                                                                   |                                                                                    | 18.4                                                                                | 14.4                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.8                                                                               | 16.1                                                                              |                                                                                   |                                                                                   | 7.1                                                                               |                                                                                   |                                                                                    | 9.5                                                                                 | 0.3                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 9.6                                                                               | 30.2                                                                              |                                                                                   |                                                                                   | 20.1                                                                              |                                                                                   |                                                                                    | 27.9                                                                                | 14.7                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 29.1                                                                              |                                                                                   |                                                                                   | 20.1                                                                              |                                                                                   |                                                                                    | 25.2                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 25.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 58.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 75.1%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 32                                                                                | 793                                                                               | 37                                                                                | 69                                                                                | 726                                                                               | 66                                                                                | 32                                                                                  | 289                                                                                 | 40                                                                                  | 70                                                                                  | 214                                                                                 | 34                                                                                  |
| Future Volume (vph)               | 32                                                                                | 793                                                                               | 37                                                                                | 69                                                                                | 726                                                                               | 66                                                                                | 32                                                                                  | 289                                                                                 | 40                                                                                  | 70                                                                                  | 214                                                                                 | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                     | 0.99                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1789                                                                              |                                                                                   | 1711                                                                              | 1778                                                                              |                                                                                   |                                                                                     | 1766                                                                                |                                                                                     |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     | 0.14                                                                              | 1.00                                                                              |                                                                                   | 0.14                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 0.95                                                                                |                                                                                     |                                                                                     | 0.80                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 260                                                                               | 1789                                                                              |                                                                                   | 248                                                                               | 1778                                                                              |                                                                                   |                                                                                     | 1686                                                                                |                                                                                     |                                                                                     | 1417                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 32                                                                                | 793                                                                               | 37                                                                                | 69                                                                                | 726                                                                               | 66                                                                                | 32                                                                                  | 289                                                                                 | 40                                                                                  | 70                                                                                  | 214                                                                                 | 34                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                   | 8                                                                                   | 0                                                                                   | 0                                                                                   | 7                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 32                                                                                | 827                                                                               | 0                                                                                 | 69                                                                                | 786                                                                               | 0                                                                                 | 0                                                                                   | 353                                                                                 | 0                                                                                   | 0                                                                                   | 311                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 29.0                                                                              | 29.0                                                                              |                                                                                   | 29.0                                                                              | 29.0                                                                              |                                                                                   |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Effective Green, g (s)            | 29.0                                                                              | 29.0                                                                              |                                                                                   | 29.0                                                                              | 29.0                                                                              |                                                                                   |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.49                                                                              | 0.49                                                                              |                                                                                   | 0.49                                                                              | 0.49                                                                              |                                                                                   |                                                                                     | 0.31                                                                                |                                                                                     |                                                                                     | 0.31                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 127                                                                               | 879                                                                               |                                                                                   | 121                                                                               | 873                                                                               |                                                                                   |                                                                                     | 514                                                                                 |                                                                                     |                                                                                     | 432                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.46                                                                             |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.12                                                                              |                                                                                   |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   |                                                                                     | 0.21                                                                                |                                                                                     |                                                                                     | c0.22                                                                               |                                                                                     |
| v/c Ratio                         | 0.25                                                                              | 0.94                                                                              |                                                                                   | 0.57                                                                              | 0.90                                                                              |                                                                                   |                                                                                     | 0.69                                                                                |                                                                                     |                                                                                     | 0.72                                                                                |                                                                                     |
| Uniform Delay, d1                 | 8.7                                                                               | 14.2                                                                              |                                                                                   | 10.6                                                                              | 13.7                                                                              |                                                                                   |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     | 18.3                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 1.0                                                                               | 17.7                                                                              |                                                                                   | 6.3                                                                               | 12.3                                                                              |                                                                                   |                                                                                     | 7.3                                                                                 |                                                                                     |                                                                                     | 9.9                                                                                 |                                                                                     |
| Delay (s)                         | 9.8                                                                               | 31.9                                                                              |                                                                                   | 16.9                                                                              | 26.0                                                                              |                                                                                   |                                                                                     | 25.3                                                                                |                                                                                     |                                                                                     | 28.2                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                   | 25.3                                                                              |                                                                                   |                                                                                     | 25.3                                                                                |                                                                                     |                                                                                     | 28.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 59.0                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 95.9%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |  |                                                                                    |  |  |  |  |  |
| Traffic Volume (vph)              | 0                                                                                 | 1333                                                                              | 1                                                                                 | 148                                                                               | 488                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 344                                                                                 | 392                                                                                 | 135                                                                                 | 17                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 1333                                                                              | 1                                                                                 | 148                                                                               | 488                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 344                                                                                 | 392                                                                                 | 135                                                                                 | 17                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 0.95                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 0.97                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 3421                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1801                                                                                | 1531                                                                                | 3319                                                                                | 1770                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 3421                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1801                                                                                | 1531                                                                                | 3319                                                                                | 1770                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 1333                                                                              | 1                                                                                 | 148                                                                               | 488                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 344                                                                                 | 392                                                                                 | 135                                                                                 | 17                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 146                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 1334                                                                              | 0                                                                                 | 148                                                                               | 488                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 198                                                                                 | 392                                                                                 | 152                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | Prot                                                                              | NA                                                                                | Prot                                                                              |                                                                                    | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 | 8                                                                                 |                                                                                    | 2                                                                                   |                                                                                     | 1                                                                                   | 6                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 43.1                                                                              |                                                                                   | 10.0                                                                              | 59.1                                                                              | 59.1                                                                              |                                                                                    | 16.5                                                                                | 16.5                                                                                | 14.0                                                                                | 36.5                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 43.1                                                                              |                                                                                   | 10.0                                                                              | 59.1                                                                              | 59.1                                                                              |                                                                                    | 16.5                                                                                | 16.5                                                                                | 14.0                                                                                | 36.5                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.40                                                                              |                                                                                   | 0.09                                                                              | 0.55                                                                              | 0.55                                                                              |                                                                                    | 0.15                                                                                | 0.15                                                                                | 0.13                                                                                | 0.34                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 1370                                                                              |                                                                                   | 159                                                                               | 989                                                                               | 840                                                                               |                                                                                    | 276                                                                                 | 234                                                                                 | 431                                                                                 | 600                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.39                                                                             |                                                                                   | c0.09                                                                             | 0.27                                                                              | 0.27                                                                              |                                                                                    | 0.08                                                                                |                                                                                     | c0.12                                                                               | 0.09                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | c0.13                                                                               |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.97                                                                              |                                                                                   | 0.93                                                                              | 0.49                                                                              | 0.48                                                                              |                                                                                    | 0.55                                                                                | 0.84                                                                                | 0.91                                                                                | 0.25                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 31.7                                                                              |                                                                                   | 48.5                                                                              | 15.0                                                                              | 14.9                                                                              |                                                                                    | 42.1                                                                                | 44.3                                                                                | 46.2                                                                                | 25.7                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 18.8                                                                              |                                                                                   | 51.2                                                                              | 1.8                                                                               | 2.0                                                                               |                                                                                    | 2.2                                                                                 | 23.3                                                                                | 22.7                                                                                | 0.2                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 50.5                                                                              |                                                                                   | 99.6                                                                              | 16.8                                                                              | 16.9                                                                              |                                                                                    | 44.3                                                                                | 67.6                                                                                | 68.8                                                                                | 25.9                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 |                                                                                   | F                                                                                 | B                                                                                 | B                                                                                 |                                                                                    | D                                                                                   | E                                                                                   | E                                                                                   | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 50.5                                                                              |                                                                                   |                                                                                   | 28.6                                                                              |                                                                                   |                                                                                    | 60.5                                                                                |                                                                                     |                                                                                     | 56.8                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | E                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 46.3                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.93                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 107.6                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 84.4%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 3: Pine St &amp; Bank St

12/12/2016

|                                   |  |      |                                                                                   |      |                           |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|------|---------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR  | NBT                                                                               | NBR  | SBL                       | SBT                                                                               |
| Lane Configurations               |  |      |  |      |                           |  |
| Traffic Volume (vph)              | 68                                                                                | 0    | 5                                                                                 | 97   | 0                         | 14                                                                                |
| Future Volume (vph)               | 68                                                                                | 0    | 5                                                                                 | 97   | 0                         | 14                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900 | 1900                                                                              | 1900 | 1900                      | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |      | 6.0                                                                               |      |                           | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Frt                               | 1.00                                                                              |      | 0.87                                                                              |      |                           | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              |      | 1569                                                                              |      |                           | 1801                                                                              |
| Flt Permitted                     | 0.95                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              |      | 1569                                                                              |      |                           | 1801                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00 | 1.00                                                                              | 1.00 | 1.00                      | 1.00                                                                              |
| Adj. Flow (vph)                   | 68                                                                                | 0    | 5                                                                                 | 97   | 0                         | 14                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0    | 32                                                                                | 0    | 0                         | 0                                                                                 |
| Lane Group Flow (vph)             | 68                                                                                | 0    | 70                                                                                | 0    | 0                         | 14                                                                                |
| Turn Type                         | Prot                                                                              |      | NA                                                                                |      |                           | NA                                                                                |
| Protected Phases                  | 8                                                                                 |      | 2                                                                                 |      |                           | 6                                                                                 |
| Permitted Phases                  |                                                                                   |      |                                                                                   |      | 6                         |                                                                                   |
| Actuated Green, G (s)             | 3.3                                                                               |      | 31.8                                                                              |      |                           | 31.8                                                                              |
| Effective Green, g (s)            | 3.3                                                                               |      | 31.8                                                                              |      |                           | 31.8                                                                              |
| Actuated g/C Ratio                | 0.07                                                                              |      | 0.68                                                                              |      |                           | 0.68                                                                              |
| Clearance Time (s)                | 6.0                                                                               |      | 6.0                                                                               |      |                           | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               |      | 3.0                                                                               |      |                           | 3.0                                                                               |
| Lane Grp Cap (vph)                | 119                                                                               |      | 1059                                                                              |      |                           | 1215                                                                              |
| v/s Ratio Prot                    | c0.04                                                                             |      | c0.04                                                                             |      |                           | 0.01                                                                              |
| v/s Ratio Perm                    |                                                                                   |      |                                                                                   |      |                           |                                                                                   |
| v/c Ratio                         | 0.57                                                                              |      | 0.07                                                                              |      |                           | 0.01                                                                              |
| Uniform Delay, d1                 | 21.2                                                                              |      | 2.6                                                                               |      |                           | 2.5                                                                               |
| Progression Factor                | 1.00                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Incremental Delay, d2             | 6.5                                                                               |      | 0.1                                                                               |      |                           | 0.0                                                                               |
| Delay (s)                         | 27.7                                                                              |      | 2.7                                                                               |      |                           | 2.5                                                                               |
| Level of Service                  | C                                                                                 |      | A                                                                                 |      |                           | A                                                                                 |
| Approach Delay (s)                | 27.7                                                                              |      | 2.7                                                                               |      |                           | 2.5                                                                               |
| Approach LOS                      | C                                                                                 |      | A                                                                                 |      |                           | A                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |      |                                                                                   |      |                           |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |      | 11.9                                                                              |      | HCM 2000 Level of Service | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |      | 0.11                                                                              |      |                           |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |      | 47.1                                                                              |      | Sum of lost time (s)      | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |      | 20.4%                                                                             |      | ICU Level of Service      | A                                                                                 |
| Analysis Period (min)             |                                                                                   |      | 15                                                                                |      |                           |                                                                                   |
| c Critical Lane Group             |                                                                                   |      |                                                                                   |      |                           |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 4: Pine St &amp; Cherry St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 25                                                                                | 143                                                                               | 0                                                                                 | 0                                                                                 | 105                                                                               | 70                                                                                | 0                                                                                  | 5                                                                                   | 0                                                                                   | 84                                                                                  | 14                                                                                  | 74                                                                                  |
| Future Volume (vph)               | 25                                                                                | 143                                                                               | 0                                                                                 | 0                                                                                 | 105                                                                               | 70                                                                                | 0                                                                                  | 5                                                                                   | 0                                                                                   | 84                                                                                  | 14                                                                                  | 74                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.95                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.94                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1787                                                                              |                                                                                   |                                                                                   | 1703                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1656                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.91                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.87                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1641                                                                              |                                                                                   |                                                                                   | 1703                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1472                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 25                                                                                | 143                                                                               | 0                                                                                 | 0                                                                                 | 105                                                                               | 70                                                                                | 0                                                                                  | 5                                                                                   | 0                                                                                   | 84                                                                                  | 14                                                                                  | 74                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 57                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 34                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 168                                                                               | 0                                                                                 | 0                                                                                 | 118                                                                               | 0                                                                                 | 0                                                                                  | 5                                                                                   | 0                                                                                   | 0                                                                                   | 138                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   |                                                                                    | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 8.1                                                                               |                                                                                   |                                                                                   | 8.1                                                                               |                                                                                   |                                                                                    | 23.1                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 8.1                                                                               |                                                                                   |                                                                                   | 8.1                                                                               |                                                                                   |                                                                                    | 23.1                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.19                                                                              |                                                                                   |                                                                                   | 0.19                                                                              |                                                                                   |                                                                                    | 0.53                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 307                                                                               |                                                                                   |                                                                                   | 319                                                                               |                                                                                   |                                                                                    | 963                                                                                 |                                                                                     |                                                                                     | 787                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.07                                                                              |                                                                                   |                                                                                    | 0.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.10                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.09                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   | 0.37                                                                              |                                                                                   |                                                                                    | 0.01                                                                                |                                                                                     |                                                                                     | 0.17                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 15.9                                                                              |                                                                                   |                                                                                   | 15.3                                                                              |                                                                                   |                                                                                    | 4.7                                                                                 |                                                                                     |                                                                                     | 5.2                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 2.0                                                                               |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 17.9                                                                              |                                                                                   |                                                                                   | 16.1                                                                              |                                                                                   |                                                                                    | 4.7                                                                                 |                                                                                     |                                                                                     | 5.6                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 17.9                                                                              |                                                                                   |                                                                                   | 16.1                                                                              |                                                                                   |                                                                                    | 4.7                                                                                 |                                                                                     |                                                                                     | 5.6                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 13.1                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 43.2                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 50.3%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                       | SBT                                                                               |
| Lane Configurations               |  |  |  |  |                           |  |
| Traffic Volume (vph)              | 162                                                                               | 81                                                                                | 318                                                                               | 182                                                                               | 329                       | 1353                                                                              |
| Future Volume (vph)               | 162                                                                               | 81                                                                                | 318                                                                               | 182                                                                               | 329                       | 1353                                                                              |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                      | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                           | 0.95                                                                              |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                           | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.99                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 3388                                                                              |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.79                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 2710                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                      | 1.00                                                                              |
| Adj. Flow (vph)                   | 162                                                                               | 81                                                                                | 318                                                                               | 182                                                                               | 329                       | 1353                                                                              |
| RTOR Reduction (vph)              | 0                                                                                 | 69                                                                                | 0                                                                                 | 52                                                                                | 0                         | 0                                                                                 |
| Lane Group Flow (vph)             | 162                                                                               | 12                                                                                | 318                                                                               | 130                                                                               | 0                         | 1682                                                                              |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                      | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                           | 6                                                                                 |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                         |                                                                                   |
| Actuated Green, G (s)             | 13.3                                                                              | 13.3                                                                              | 63.1                                                                              | 63.1                                                                              |                           | 63.1                                                                              |
| Effective Green, g (s)            | 13.3                                                                              | 13.3                                                                              | 63.1                                                                              | 63.1                                                                              |                           | 63.1                                                                              |
| Actuated g/C Ratio                | 0.15                                                                              | 0.15                                                                              | 0.71                                                                              | 0.71                                                                              |                           | 0.71                                                                              |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                           | 3.0                                                                               |
| Lane Grp Cap (vph)                | 257                                                                               | 230                                                                               | 1285                                                                              | 1922                                                                              |                           | 1934                                                                              |
| v/s Ratio Prot                    | c0.09                                                                             |                                                                                   | 0.18                                                                              |                                                                                   |                           |                                                                                   |
| v/s Ratio Perm                    |                                                                                   | 0.01                                                                              |                                                                                   | 0.05                                                                              |                           | c0.62                                                                             |
| v/c Ratio                         | 0.63                                                                              | 0.05                                                                              | 0.25                                                                              | 0.07                                                                              |                           | 0.87                                                                              |
| Uniform Delay, d1                 | 35.2                                                                              | 32.2                                                                              | 4.4                                                                               | 3.8                                                                               |                           | 9.5                                                                               |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 1.00                                                                              |
| Incremental Delay, d2             | 5.0                                                                               | 0.1                                                                               | 0.5                                                                               | 0.1                                                                               |                           | 5.7                                                                               |
| Delay (s)                         | 40.2                                                                              | 32.3                                                                              | 4.9                                                                               | 3.9                                                                               |                           | 15.2                                                                              |
| Level of Service                  | D                                                                                 | C                                                                                 | A                                                                                 | A                                                                                 |                           | B                                                                                 |
| Approach Delay (s)                | 37.6                                                                              |                                                                                   | 4.5                                                                               |                                                                                   |                           | 15.2                                                                              |
| Approach LOS                      | D                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                           | B                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.2                                                                              |                                                                                   | HCM 2000 Level of Service | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.83                                                                              |                                                                                   |                           |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.4                                                                              |                                                                                   | Sum of lost time (s)      | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 87.7%                                                                             |                                                                                   | ICU Level of Service      | E                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                           |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (vph)              | 372                                                                               | 62                                                                                | 119                                                                               | 321                                                                               | 36                                                                                | 44                                                                                |
| Future Volume (vph)               | 372                                                                               | 62                                                                                | 119                                                                               | 321                                                                               | 36                                                                                | 44                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Frt                               | 0.98                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.93                                                                              |                                                                                   |
| Flt Protected                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (prot)                 | 1766                                                                              |                                                                                   |                                                                                   | 1777                                                                              | 1630                                                                              |                                                                                   |
| Flt Permitted                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.65                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (perm)                 | 1766                                                                              |                                                                                   |                                                                                   | 1175                                                                              | 1630                                                                              |                                                                                   |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 372                                                                               | 62                                                                                | 119                                                                               | 321                                                                               | 36                                                                                | 44                                                                                |
| RTOR Reduction (vph)              | 12                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 28                                                                                | 0                                                                                 |
| Lane Group Flow (vph)             | 422                                                                               | 0                                                                                 | 0                                                                                 | 440                                                                               | 52                                                                                | 0                                                                                 |
| Turn Type                         | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Prot                                                                              |                                                                                   |
| Protected Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2                                                                                 |                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Actuated Green, G (s)             | 21.4                                                                              |                                                                                   |                                                                                   | 21.4                                                                              | 18.3                                                                              |                                                                                   |
| Effective Green, g (s)            | 21.4                                                                              |                                                                                   |                                                                                   | 21.4                                                                              | 18.3                                                                              |                                                                                   |
| Actuated g/C Ratio                | 0.41                                                                              |                                                                                   |                                                                                   | 0.41                                                                              | 0.35                                                                              |                                                                                   |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |
| Lane Grp Cap (vph)                | 730                                                                               |                                                                                   |                                                                                   | 486                                                                               | 576                                                                               |                                                                                   |
| v/s Ratio Prot                    | 0.24                                                                              |                                                                                   |                                                                                   |                                                                                   | c0.03                                                                             |                                                                                   |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | c0.37                                                                             |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.58                                                                              |                                                                                   |                                                                                   | 0.91                                                                              | 0.09                                                                              |                                                                                   |
| Uniform Delay, d1                 | 11.7                                                                              |                                                                                   |                                                                                   | 14.2                                                                              | 11.1                                                                              |                                                                                   |
| Progression Factor                | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Incremental Delay, d2             | 1.1                                                                               |                                                                                   |                                                                                   | 20.2                                                                              | 0.3                                                                               |                                                                                   |
| Delay (s)                         | 12.8                                                                              |                                                                                   |                                                                                   | 34.4                                                                              | 11.4                                                                              |                                                                                   |
| Level of Service                  | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| Approach Delay (s)                | 12.8                                                                              |                                                                                   |                                                                                   | 34.4                                                                              | 11.4                                                                              |                                                                                   |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 22.6                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | C                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.53                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 51.7                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 66.5%                                                                             |                                                                                   | ICU Level of Service                                                              | C                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL   | WBT   | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|-------|-------|-------|---------------------------|-------|------|------|------|------|------|
| Lane Configurations               |      | ↑    | ↑     | ↑     | ↑     |                           | ↑     |      | ↑    | ↑    | ↑↓   | ↑    |
| Traffic Volume (vph)              | 0    | 202  | 100   | 201   | 428   | 0                         | 126   | 0    | 108  | 59   | 376  | 83   |
| Future Volume (vph)               | 0    | 202  | 100   | 201   | 428   | 0                         | 126   | 0    | 108  | 59   | 376  | 83   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900  | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0  | 6.0   | 6.0   | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Lane Util. Factor                 |      | 1.00 | 1.00  | 1.00  | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 0.95 |      |
| Frt                               |      | 1.00 | 0.85  | 1.00  | 1.00  |                           | 1.00  |      | 0.85 | 1.00 | 0.97 |      |
| Flt Protected                     |      | 1.00 | 1.00  | 0.95  | 1.00  |                           | 0.95  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (prot)                 |      | 1801 | 1531  | 1711  | 1801  |                           | 1711  |      | 1531 | 1711 | 3328 |      |
| Flt Permitted                     |      | 1.00 | 1.00  | 0.95  | 1.00  |                           | 0.49  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (perm)                 |      | 1801 | 1531  | 1711  | 1801  |                           | 878   |      | 1531 | 1711 | 3328 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00  | 1.00  | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 202  | 100   | 201   | 428   | 0                         | 126   | 0    | 108  | 59   | 376  | 83   |
| RTOR Reduction (vph)              | 0    | 0    | 0     | 0     | 0     | 0                         | 0     | 0    | 71   | 0    | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 202  | 100   | 201   | 428   | 0                         | 126   | 0    | 37   | 59   | 459  | 0    |
| Turn Type                         |      | NA   | Perm  | Prot  | NA    |                           | Perm  |      | Perm | Perm | NA   |      |
| Protected Phases                  |      | 4    |       | 3     | 8     |                           |       |      |      |      | 6    |      |
| Permitted Phases                  |      |      | 4     |       |       |                           | 2     |      | 2    | 6    |      |      |
| Actuated Green, G (s)             |      | 11.3 | 11.3  | 6.0   | 23.3  |                           | 18.1  |      | 18.1 | 18.1 | 18.1 |      |
| Effective Green, g (s)            |      | 11.3 | 11.3  | 6.0   | 23.3  |                           | 18.1  |      | 18.1 | 18.1 | 18.1 |      |
| Actuated g/C Ratio                |      | 0.21 | 0.21  | 0.11  | 0.44  |                           | 0.34  |      | 0.34 | 0.34 | 0.34 |      |
| Clearance Time (s)                |      | 6.0  | 6.0   | 6.0   | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  | 3.0   | 3.0   | 3.0   |                           | 3.0   |      | 3.0  | 3.0  | 3.0  |      |
| Lane Grp Cap (vph)                |      | 381  | 323   | 192   | 785   |                           | 297   |      | 518  | 579  | 1128 |      |
| v/s Ratio Prot                    |      | 0.11 |       | c0.12 | c0.24 |                           |       |      |      |      | 0.14 |      |
| v/s Ratio Perm                    |      |      | 0.07  |       |       |                           | c0.14 |      | 0.02 | 0.03 |      |      |
| v/c Ratio                         |      | 0.53 | 0.31  | 1.05  | 0.55  |                           | 0.42  |      | 0.07 | 0.10 | 0.41 |      |
| Uniform Delay, d1                 |      | 18.7 | 17.8  | 23.7  | 11.1  |                           | 13.6  |      | 12.0 | 12.1 | 13.5 |      |
| Progression Factor                |      | 1.00 | 1.00  | 1.00  | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 1.00 |      |
| Incremental Delay, d2             |      | 1.4  | 0.5   | 77.8  | 0.8   |                           | 4.4   |      | 0.3  | 0.4  | 1.1  |      |
| Delay (s)                         |      | 20.1 | 18.3  | 101.5 | 11.9  |                           | 18.0  |      | 12.2 | 12.4 | 14.6 |      |
| Level of Service                  |      | C    | B     | F     | B     |                           | B     |      | B    | B    | B    |      |
| Approach Delay (s)                |      | 19.5 |       |       | 40.5  |                           |       | 15.3 |      |      | 14.4 |      |
| Approach LOS                      |      | B    |       |       | D     |                           |       | B    |      |      | B    |      |
| <b>Intersection Summary</b>       |      |      |       |       |       |                           |       |      |      |      |      |      |
| HCM 2000 Control Delay            |      |      | 25.2  |       |       | HCM 2000 Level of Service |       |      | C    |      |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.62  |       |       |                           |       |      |      |      |      |      |
| Actuated Cycle Length (s)         |      |      | 53.4  |       |       | Sum of lost time (s)      |       |      | 18.0 |      |      |      |
| Intersection Capacity Utilization |      |      | 60.1% |       |       | ICU Level of Service      |       |      | B    |      |      |      |
| Analysis Period (min)             |      |      | 15    |       |       |                           |       |      |      |      |      |      |
| c Critical Lane Group             |      |      |       |       |       |                           |       |      |      |      |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 54                                                                                | 344                                                                               | 0                                                                                 | 0                                                                                 | 529                                                                               | 67                                                                                | 30                                                                                  | 105                                                                                 | 51                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 54                                                                                | 344                                                                               | 0                                                                                 | 0                                                                                 | 529                                                                               | 67                                                                                | 30                                                                                  | 105                                                                                 | 51                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                                | 0.95                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1773                                                                              |                                                                                   | 1711                                                                                | 1712                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.25                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 452                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1773                                                                              |                                                                                   | 1711                                                                                | 1712                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 54                                                                                | 344                                                                               | 0                                                                                 | 0                                                                                 | 529                                                                               | 67                                                                                | 30                                                                                  | 105                                                                                 | 51                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                   | 30                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 54                                                                                | 344                                                                               | 0                                                                                 | 0                                                                                 | 587                                                                               | 0                                                                                 | 30                                                                                  | 126                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 20.9                                                                              | 20.9                                                                              |                                                                                   |                                                                                   | 20.9                                                                              |                                                                                   | 18.2                                                                                | 18.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 20.9                                                                              | 20.9                                                                              |                                                                                   |                                                                                   | 20.9                                                                              |                                                                                   | 18.2                                                                                | 18.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.41                                                                              | 0.41                                                                              |                                                                                   |                                                                                   | 0.41                                                                              |                                                                                   | 0.36                                                                                | 0.36                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 184                                                                               | 736                                                                               |                                                                                   |                                                                                   | 725                                                                               |                                                                                   | 609                                                                                 | 609                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.19                                                                              |                                                                                   |                                                                                   | c0.33                                                                             |                                                                                   |                                                                                     | c0.07                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.12                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.29                                                                              | 0.47                                                                              |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   | 0.05                                                                                | 0.21                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 10.1                                                                              | 11.0                                                                              |                                                                                   |                                                                                   | 13.3                                                                              |                                                                                   | 10.8                                                                                | 11.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.9                                                                               | 0.5                                                                               |                                                                                   |                                                                                   | 6.7                                                                               |                                                                                   | 0.2                                                                                 | 0.8                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 11.0                                                                              | 11.5                                                                              |                                                                                   |                                                                                   | 20.0                                                                              |                                                                                   | 10.9                                                                                | 12.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.4                                                                              |                                                                                   |                                                                                   | 20.0                                                                              |                                                                                   |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.9                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.53                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 51.1                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 59.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 19                                                                                | 352                                                                               | 47                                                                                | 49                                                                                | 518                                                                               | 17                                                                                | 34                                                                                 | 107                                                                                 | 50                                                                                  | 25                                                                                  | 240                                                                                 | 34                                                                                  |
| Future Volume (vph)               | 19                                                                                | 352                                                                               | 47                                                                                | 49                                                                                | 518                                                                               | 17                                                                                | 34                                                                                 | 107                                                                                 | 50                                                                                  | 25                                                                                  | 240                                                                                 | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1769                                                                              |                                                                                   | 1711                                                                              | 1792                                                                              |                                                                                   |                                                                                    | 1722                                                                                |                                                                                     |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.96                                                                              |                                                                                   | 0.49                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.90                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1709                                                                              |                                                                                   | 887                                                                               | 1792                                                                              |                                                                                   |                                                                                    | 1561                                                                                |                                                                                     |                                                                                     | 1707                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 19                                                                                | 352                                                                               | 47                                                                                | 49                                                                                | 518                                                                               | 17                                                                                | 34                                                                                 | 107                                                                                 | 50                                                                                  | 25                                                                                  | 240                                                                                 | 34                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 26                                                                                  | 0                                                                                   | 0                                                                                   | 9                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 409                                                                               | 0                                                                                 | 49                                                                                | 533                                                                               | 0                                                                                 | 0                                                                                  | 165                                                                                 | 0                                                                                   | 0                                                                                   | 290                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              |                                                                                   |                                                                                    | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 20.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              |                                                                                   |                                                                                    | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.40                                                                              |                                                                                   | 0.40                                                                              | 0.40                                                                              |                                                                                   |                                                                                    | 0.36                                                                                |                                                                                     |                                                                                     | 0.36                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 683                                                                               |                                                                                   | 354                                                                               | 716                                                                               |                                                                                   |                                                                                    | 561                                                                                 |                                                                                     |                                                                                     | 614                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | c0.30                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.24                                                                              |                                                                                   | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.11                                                                                |                                                                                     |                                                                                     | c0.17                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.60                                                                              |                                                                                   | 0.14                                                                              | 0.74                                                                              |                                                                                   |                                                                                    | 0.29                                                                                |                                                                                     |                                                                                     | 0.47                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.8                                                                              |                                                                                   | 9.5                                                                               | 12.8                                                                              |                                                                                   |                                                                                    | 11.5                                                                                |                                                                                     |                                                                                     | 12.3                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 3.9                                                                               |                                                                                   | 0.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                    | 1.3                                                                                 |                                                                                     |                                                                                     | 2.6                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 15.7                                                                              |                                                                                   | 10.3                                                                              | 19.7                                                                              |                                                                                   |                                                                                    | 12.8                                                                                |                                                                                     |                                                                                     | 14.9                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   | B                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 15.7                                                                              |                                                                                   |                                                                                   | 18.9                                                                              |                                                                                   |                                                                                    | 12.8                                                                                |                                                                                     |                                                                                     | 14.9                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 16.4                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 50.0                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 65.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

| Movement                          | EBL  | EBT   | EBR   | WBL   | WBT   | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT   | SBR  |
|-----------------------------------|------|-------|-------|-------|-------|---------------------------|-------|------|------|------|-------|------|
| Lane Configurations               |      | ↔     |       | ↔     | ↔     |                           | ↔     | ↑    | ↔    |      | ↔     |      |
| Traffic Volume (vph)              | 0    | 403   | 75    | 197   | 554   | 45                        | 76    | 74   | 121  | 38   | 224   | 27   |
| Future Volume (vph)               | 0    | 403   | 75    | 197   | 554   | 45                        | 76    | 74   | 121  | 38   | 224   | 27   |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900  | 1900  | 1900  | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900  | 1900 |
| Total Lost time (s)               |      | 6.0   |       | 6.0   | 6.0   |                           | 6.0   | 6.0  | 6.0  |      | 6.0   |      |
| Lane Util. Factor                 |      | 1.00  |       | 1.00  | 1.00  |                           | 1.00  | 1.00 | 1.00 |      | 1.00  |      |
| Frt                               |      | 0.98  |       | 1.00  | 0.99  |                           | 1.00  | 1.00 | 0.85 |      | 0.99  |      |
| Flt Protected                     |      | 1.00  |       | 0.95  | 1.00  |                           | 0.95  | 1.00 | 1.00 |      | 0.99  |      |
| Satd. Flow (prot)                 |      | 1763  |       | 1711  | 1780  |                           | 1711  | 1801 | 1531 |      | 1766  |      |
| Flt Permitted                     |      | 1.00  |       | 0.25  | 1.00  |                           | 0.95  | 1.00 | 1.00 |      | 0.99  |      |
| Satd. Flow (perm)                 |      | 1763  |       | 452   | 1780  |                           | 1711  | 1801 | 1531 |      | 1766  |      |
| Peak-hour factor, PHF             | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00  | 1.00 |
| Adj. Flow (vph)                   | 0    | 403   | 75    | 197   | 554   | 45                        | 76    | 74   | 121  | 38   | 224   | 27   |
| RTOR Reduction (vph)              | 0    | 7     | 0     | 0     | 0     | 0                         | 0     | 0    | 109  | 0    | 5     | 0    |
| Lane Group Flow (vph)             | 0    | 471   | 0     | 197   | 599   | 0                         | 76    | 74   | 12   | 0    | 284   | 0    |
| Turn Type                         |      | NA    |       | pm+pt | NA    |                           | Split | NA   | Perm |      | Split | NA   |
| Protected Phases                  |      | 4     |       | 3     | 8     |                           | 2     | 2    |      |      | 6     | 6    |
| Permitted Phases                  | 4    |       |       | 8     |       |                           |       |      | 2    |      |       |      |
| Actuated Green, G (s)             |      | 20.4  |       | 31.7  | 31.7  |                           | 7.3   | 7.3  | 7.3  |      | 15.6  |      |
| Effective Green, g (s)            |      | 20.4  |       | 31.7  | 31.7  |                           | 7.3   | 7.3  | 7.3  |      | 15.6  |      |
| Actuated g/C Ratio                |      | 0.28  |       | 0.44  | 0.44  |                           | 0.10  | 0.10 | 0.10 |      | 0.21  |      |
| Clearance Time (s)                |      | 6.0   |       | 6.0   | 6.0   |                           | 6.0   | 6.0  | 6.0  |      | 6.0   |      |
| Vehicle Extension (s)             |      | 3.0   |       | 3.0   | 3.0   |                           | 3.0   | 3.0  | 3.0  |      | 3.0   |      |
| Lane Grp Cap (vph)                |      | 495   |       | 289   | 777   |                           | 172   | 181  | 153  |      | 379   |      |
| v/s Ratio Prot                    |      | c0.27 |       | 0.05  | c0.34 |                           | c0.04 | 0.04 |      |      | c0.16 |      |
| v/s Ratio Perm                    |      |       |       | 0.25  |       |                           |       |      | 0.01 |      |       |      |
| v/c Ratio                         |      | 0.95  |       | 0.68  | 0.77  |                           | 0.44  | 0.41 | 0.08 |      | 0.75  |      |
| Uniform Delay, d1                 |      | 25.6  |       | 25.1  | 17.4  |                           | 30.7  | 30.6 | 29.6 |      | 26.7  |      |
| Progression Factor                |      | 1.00  |       | 1.00  | 1.00  |                           | 1.00  | 1.00 | 1.00 |      | 1.00  |      |
| Incremental Delay, d2             |      | 30.0  |       | 6.5   | 7.3   |                           | 1.8   | 1.5  | 0.2  |      | 8.1   |      |
| Delay (s)                         |      | 55.6  |       | 31.5  | 24.6  |                           | 32.5  | 32.1 | 29.8 |      | 34.8  |      |
| Level of Service                  |      | E     |       | C     | C     |                           | C     | C    | C    |      | C     |      |
| Approach Delay (s)                |      | 55.6  |       |       | 26.4  |                           |       | 31.2 |      |      | 34.8  |      |
| Approach LOS                      |      | E     |       |       | C     |                           |       | C    |      |      | C     |      |
| <b>Intersection Summary</b>       |      |       |       |       |       |                           |       |      |      |      |       |      |
| HCM 2000 Control Delay            |      |       | 36.0  |       |       | HCM 2000 Level of Service |       |      | D    |      |       |      |
| HCM 2000 Volume to Capacity ratio |      |       | 0.83  |       |       |                           |       |      |      |      |       |      |
| Actuated Cycle Length (s)         |      |       | 72.6  |       |       | Sum of lost time (s)      |       |      | 24.0 |      |       |      |
| Intersection Capacity Utilization |      |       | 94.8% |       |       | ICU Level of Service      |       |      | F    |      |       |      |
| Analysis Period (min)             |      |       | 15    |       |       |                           |       |      |      |      |       |      |
| c Critical Lane Group             |      |       |       |       |       |                           |       |      |      |      |       |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 10                                                                                | 407                                                                               | 82                                                                                | 81                                                                                | 428                                                                               | 124                                                                               | 54                                                                                 | 142                                                                                 | 56                                                                                  | 48                                                                                  | 82                                                                                  | 14                                                                                  |
| Future Volume (vph)               | 10                                                                                | 407                                                                               | 82                                                                                | 81                                                                                | 428                                                                               | 124                                                                               | 54                                                                                 | 142                                                                                 | 56                                                                                  | 48                                                                                  | 82                                                                                  | 14                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1759                                                                              |                                                                                   |                                                                                   | 1742                                                                              |                                                                                   |                                                                                    | 1776                                                                                | 1531                                                                                |                                                                                     | 1748                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                    | 0.88                                                                                | 1.00                                                                                |                                                                                     | 0.84                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1735                                                                              |                                                                                   |                                                                                   | 1556                                                                              |                                                                                   |                                                                                    | 1579                                                                                | 1531                                                                                |                                                                                     | 1497                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 10                                                                                | 407                                                                               | 82                                                                                | 81                                                                                | 428                                                                               | 124                                                                               | 54                                                                                 | 142                                                                                 | 56                                                                                  | 48                                                                                  | 82                                                                                  | 14                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                 | 16                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 38                                                                                  | 0                                                                                   | 6                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 486                                                                               | 0                                                                                 | 0                                                                                 | 617                                                                               | 0                                                                                 | 0                                                                                  | 196                                                                                 | 18                                                                                  | 0                                                                                   | 138                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                |                                                                                     | 18.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                |                                                                                     | 18.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                    | 0.33                                                                                | 0.33                                                                                |                                                                                     | 0.33                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 797                                                                               |                                                                                   |                                                                                   | 715                                                                               |                                                                                   |                                                                                    | 514                                                                                 | 498                                                                                 |                                                                                     | 487                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   | c0.40                                                                             |                                                                                   |                                                                                    | c0.12                                                                               | 0.01                                                                                |                                                                                     | 0.09                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                    | 0.38                                                                                | 0.04                                                                                |                                                                                     | 0.28                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.3                                                                              |                                                                                   |                                                                                   | 13.5                                                                              |                                                                                   |                                                                                    | 14.5                                                                                | 12.9                                                                                |                                                                                     | 14.0                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.3                                                                               |                                                                                   |                                                                                   | 10.5                                                                              |                                                                                   |                                                                                    | 2.1                                                                                 | 0.1                                                                                 |                                                                                     | 1.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 12.7                                                                              |                                                                                   |                                                                                   | 24.1                                                                              |                                                                                   |                                                                                    | 16.7                                                                                | 13.0                                                                                |                                                                                     | 15.5                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 12.7                                                                              |                                                                                   |                                                                                   | 24.1                                                                              |                                                                                   |                                                                                    | 15.8                                                                                |                                                                                     |                                                                                     | 15.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 18.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.66                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 55.9                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 99.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |  |  |  |
| Traffic Volume (vph)              | 3                                                                                 | 322                                                                               | 75                                                                                | 59                                                                                | 472                                                                               | 102                                                                               | 100                                                                                | 154                                                                                 | 40                                                                                  | 47                                                                                  | 37                                                                                  | 13                                                                                  |
| Future Volume (vph)               | 3                                                                                 | 322                                                                               | 75                                                                                | 59                                                                                | 472                                                                               | 102                                                                               | 100                                                                                | 154                                                                                 | 40                                                                                  | 47                                                                                  | 37                                                                                  | 13                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.96                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1800                                                                              | 1531                                                                              | 1711                                                                              | 1753                                                                              |                                                                                   |                                                                                    | 1766                                                                                | 1531                                                                                | 1711                                                                                | 1730                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.55                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.85                                                                                | 1.00                                                                                | 0.60                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1791                                                                              | 1531                                                                              | 983                                                                               | 1753                                                                              |                                                                                   |                                                                                    | 1533                                                                                | 1531                                                                                | 1084                                                                                | 1730                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 3                                                                                 | 322                                                                               | 75                                                                                | 59                                                                                | 472                                                                               | 102                                                                               | 100                                                                                | 154                                                                                 | 40                                                                                  | 47                                                                                  | 37                                                                                  | 13                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 45                                                                                | 0                                                                                 | 16                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 26                                                                                  | 0                                                                                   | 8                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 325                                                                               | 30                                                                                | 59                                                                                | 558                                                                               | 0                                                                                 | 0                                                                                  | 254                                                                                 | 14                                                                                  | 47                                                                                  | 42                                                                                  | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.3                                                                              | 20.3                                                                              | 20.3                                                                              | 20.3                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                | 18.2                                                                                | 18.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 20.3                                                                              | 20.3                                                                              | 20.3                                                                              | 20.3                                                                              |                                                                                   |                                                                                    | 18.2                                                                                | 18.2                                                                                | 18.2                                                                                | 18.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.40                                                                              | 0.40                                                                              | 0.40                                                                              | 0.40                                                                              |                                                                                   |                                                                                    | 0.36                                                                                | 0.36                                                                                | 0.36                                                                                | 0.36                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 719                                                                               | 615                                                                               | 395                                                                               | 704                                                                               |                                                                                   |                                                                                    | 552                                                                                 | 551                                                                                 | 390                                                                                 | 623                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.32                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | 0.02                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.18                                                                              | 0.02                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.17                                                                               | 0.01                                                                                | 0.04                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.45                                                                              | 0.05                                                                              | 0.15                                                                              | 0.79                                                                              |                                                                                   |                                                                                    | 0.46                                                                                | 0.03                                                                                | 0.12                                                                                | 0.07                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.0                                                                              | 9.2                                                                               | 9.6                                                                               | 13.3                                                                              |                                                                                   |                                                                                    | 12.4                                                                                | 10.4                                                                                | 10.8                                                                                | 10.6                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 0.5                                                                               | 0.0                                                                               | 0.2                                                                               | 6.1                                                                               |                                                                                   |                                                                                    | 2.7                                                                                 | 0.1                                                                                 | 0.6                                                                                 | 0.2                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 11.5                                                                              | 9.2                                                                               | 9.8                                                                               | 19.4                                                                              |                                                                                   |                                                                                    | 15.1                                                                                | 10.5                                                                                | 11.4                                                                                | 10.8                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 | A                                                                                 | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.1                                                                              |                                                                                   |                                                                                   | 18.5                                                                              |                                                                                   |                                                                                    | 14.5                                                                                |                                                                                     |                                                                                     | 11.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.1                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.64                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 50.5                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 81.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL   | WBT  | WBR  | NBL                       | NBT  | NBR  | SBL   | SBT  | SBR  |
|-----------------------------------|------|------|-------|-------|------|------|---------------------------|------|------|-------|------|------|
| Lane Configurations               |      |      |       |       |      |      |                           |      |      |       |      |      |
| Traffic Volume (vph)              | 41   | 331  | 18    | 113   | 517  | 141  | 6                         | 53   | 11   | 95    | 253  | 119  |
| Future Volume (vph)               | 41   | 331  | 18    | 113   | 517  | 141  | 6                         | 53   | 11   | 95    | 253  | 119  |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900 | 1900 | 1900                      | 1900 | 1900 | 1900  | 1900 | 1900 |
| Total Lost time (s)               | 6.0  | 6.0  |       | 6.0   | 6.0  | 6.0  |                           | 6.0  |      | 6.0   | 6.0  | 6.0  |
| Lane Util. Factor                 | 0.95 | 0.95 |       | 1.00  | 1.00 | 1.00 |                           | 1.00 |      | 1.00  | 1.00 | 1.00 |
| Frt                               | 1.00 | 0.99 |       | 1.00  | 1.00 | 0.85 |                           | 0.98 |      | 1.00  | 1.00 | 0.85 |
| Flt Protected                     | 0.95 | 1.00 |       | 0.95  | 1.00 | 1.00 |                           | 1.00 |      | 0.95  | 1.00 | 1.00 |
| Satd. Flow (prot)                 | 1625 | 1697 |       | 1711  | 1801 | 1531 |                           | 1755 |      | 1711  | 1801 | 1531 |
| Flt Permitted                     | 0.31 | 0.99 |       | 0.48  | 1.00 | 1.00 |                           | 0.97 |      | 0.71  | 1.00 | 1.00 |
| Satd. Flow (perm)                 | 525  | 1686 |       | 871   | 1801 | 1531 |                           | 1707 |      | 1281  | 1801 | 1531 |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 | 1.00                      | 1.00 | 1.00 | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 41   | 331  | 18    | 113   | 517  | 141  | 6                         | 53   | 11   | 95    | 253  | 119  |
| RTOR Reduction (vph)              | 0    | 4    | 0     | 0     | 0    | 89   | 0                         | 7    | 0    | 0     | 0    | 74   |
| Lane Group Flow (vph)             | 37   | 349  | 0     | 113   | 517  | 52   | 0                         | 63   | 0    | 95    | 253  | 45   |
| Turn Type                         | Perm | NA   |       | Perm  | NA   | Perm | Perm                      | NA   |      | Perm  | NA   | Perm |
| Protected Phases                  |      | 4    |       |       | 8    |      |                           | 2    |      |       | 6    |      |
| Permitted Phases                  | 4    |      |       | 8     |      | 8    | 2                         |      |      | 6     |      | 6    |
| Actuated Green, G (s)             | 17.5 | 17.5 |       | 17.5  | 17.5 | 17.5 |                           | 18.1 |      | 18.1  | 18.1 | 18.1 |
| Effective Green, g (s)            | 17.5 | 17.5 |       | 17.5  | 17.5 | 17.5 |                           | 18.1 |      | 18.1  | 18.1 | 18.1 |
| Actuated g/C Ratio                | 0.37 | 0.37 |       | 0.37  | 0.37 | 0.37 |                           | 0.38 |      | 0.38  | 0.38 | 0.38 |
| Clearance Time (s)                | 6.0  | 6.0  |       | 6.0   | 6.0  | 6.0  |                           | 6.0  |      | 6.0   | 6.0  | 6.0  |
| Vehicle Extension (s)             | 3.0  | 3.0  |       | 3.0   | 3.0  | 3.0  |                           | 3.0  |      | 3.0   | 3.0  | 3.0  |
| Lane Grp Cap (vph)                | 193  | 619  |       | 320   | 662  | 562  |                           | 649  |      | 487   | 684  | 582  |
| v/s Ratio Prot                    |      |      |       | c0.29 |      |      |                           |      |      | c0.14 |      |      |
| v/s Ratio Perm                    | 0.07 | 0.21 |       | 0.13  |      | 0.03 |                           | 0.04 |      | 0.07  |      | 0.03 |
| v/c Ratio                         | 0.19 | 0.56 |       | 0.35  | 0.78 | 0.09 |                           | 0.10 |      | 0.20  | 0.37 | 0.08 |
| Uniform Delay, d1                 | 10.2 | 12.0 |       | 10.9  | 13.3 | 9.9  |                           | 9.5  |      | 9.9   | 10.6 | 9.4  |
| Progression Factor                | 1.00 | 1.00 |       | 1.00  | 1.00 | 1.00 |                           | 1.00 |      | 1.00  | 1.00 | 1.00 |
| Incremental Delay, d2             | 0.5  | 1.2  |       | 0.7   | 6.0  | 0.1  |                           | 0.3  |      | 0.9   | 1.5  | 0.3  |
| Delay (s)                         | 10.7 | 13.2 |       | 11.6  | 19.3 | 9.9  |                           | 9.8  |      | 10.8  | 12.2 | 9.7  |
| Level of Service                  | B    | B    |       | B     | B    | A    |                           | A    |      | B     | B    | A    |
| Approach Delay (s)                |      | 13.0 |       |       | 16.5 |      |                           | 9.8  |      |       | 11.3 |      |
| Approach LOS                      |      | B    |       |       | B    |      |                           | A    |      |       | B    |      |
| <b>Intersection Summary</b>       |      |      |       |       |      |      |                           |      |      |       |      |      |
| HCM 2000 Control Delay            |      |      | 14.0  |       |      |      | HCM 2000 Level of Service |      |      | B     |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.57  |       |      |      |                           |      |      |       |      |      |
| Actuated Cycle Length (s)         |      |      | 47.6  |       |      |      | Sum of lost time (s)      |      |      | 12.0  |      |      |
| Intersection Capacity Utilization |      |      | 73.1% |       |      |      | ICU Level of Service      |      |      | D     |      |      |
| Analysis Period (min)             |      |      | 15    |       |      |      |                           |      |      |       |      |      |
| c Critical Lane Group             |      |      |       |       |      |      |                           |      |      |       |      |      |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 14                                                                                | 450                                                                               | 0                                                                                 | 0                                                                                 | 768                                                                               | 32                                                                                | 41                                                                                 | 542                                                                                 | 46                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 14                                                                                | 450                                                                               | 0                                                                                 | 0                                                                                 | 768                                                                               | 32                                                                                | 41                                                                                 | 542                                                                                 | 46                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1791                                                                              |                                                                                   |                                                                                    | 1794                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.10                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 174                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1791                                                                              |                                                                                   |                                                                                    | 1794                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 14                                                                                | 450                                                                               | 0                                                                                 | 0                                                                                 | 768                                                                               | 32                                                                                | 41                                                                                 | 542                                                                                 | 46                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 22                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 14                                                                                | 450                                                                               | 0                                                                                 | 0                                                                                 | 798                                                                               | 0                                                                                 | 0                                                                                  | 583                                                                                 | 24                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 41.4                                                                              | 41.4                                                                              |                                                                                   |                                                                                   | 41.4                                                                              |                                                                                   |                                                                                    | 35.0                                                                                | 35.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 41.4                                                                              | 41.4                                                                              |                                                                                   |                                                                                   | 41.4                                                                              |                                                                                   |                                                                                    | 35.0                                                                                | 35.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.47                                                                              | 0.47                                                                              |                                                                                   |                                                                                   | 0.47                                                                              |                                                                                   |                                                                                    | 0.40                                                                                | 0.40                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 81                                                                                | 843                                                                               |                                                                                   |                                                                                   | 838                                                                               |                                                                                   |                                                                                    | 710                                                                                 | 606                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.25                                                                              |                                                                                   |                                                                                   | c0.45                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.32                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.17                                                                              | 0.53                                                                              |                                                                                   |                                                                                   | 0.95                                                                              |                                                                                   |                                                                                    | 0.82                                                                                | 0.04                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 13.6                                                                              | 16.7                                                                              |                                                                                   |                                                                                   | 22.6                                                                              |                                                                                   |                                                                                    | 23.9                                                                                | 16.4                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 1.0                                                                               | 0.7                                                                               |                                                                                   |                                                                                   | 20.4                                                                              |                                                                                   |                                                                                    | 10.3                                                                                | 0.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 14.6                                                                              | 17.3                                                                              |                                                                                   |                                                                                   | 42.9                                                                              |                                                                                   |                                                                                    | 34.2                                                                                | 16.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 17.2                                                                              |                                                                                   |                                                                                   | 42.9                                                                              |                                                                                   |                                                                                    | 32.9                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 33.3                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.4                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 83.2%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 15                                                                                | 444                                                                               | 14                                                                                | 56                                                                                | 650                                                                               | 32                                                                                | 21                                                                                 | 194                                                                                 | 47                                                                                  | 66                                                                                  | 203                                                                                 | 19                                                                                  |
| Future Volume (vph)               | 15                                                                                | 444                                                                               | 14                                                                                | 56                                                                                | 650                                                                               | 32                                                                                | 21                                                                                 | 194                                                                                 | 47                                                                                  | 66                                                                                  | 203                                                                                 | 19                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1792                                                                              |                                                                                   | 1711                                                                              | 1788                                                                              |                                                                                   |                                                                                    | 1750                                                                                |                                                                                     |                                                                                     | 1764                                                                                |                                                                                     |
| Flt Permitted                     | 0.19                                                                              | 1.00                                                                              |                                                                                   | 0.40                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.87                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 334                                                                               | 1792                                                                              |                                                                                   | 721                                                                               | 1788                                                                              |                                                                                   |                                                                                    | 1684                                                                                |                                                                                     |                                                                                     | 1561                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 15                                                                                | 444                                                                               | 14                                                                                | 56                                                                                | 650                                                                               | 32                                                                                | 21                                                                                 | 194                                                                                 | 47                                                                                  | 66                                                                                  | 203                                                                                 | 19                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                  | 13                                                                                  | 0                                                                                   | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 15                                                                                | 456                                                                               | 0                                                                                 | 56                                                                                | 679                                                                               | 0                                                                                 | 0                                                                                  | 249                                                                                 | 0                                                                                   | 0                                                                                   | 284                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 25.0                                                                              | 25.0                                                                              |                                                                                   | 25.0                                                                              | 25.0                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 25.0                                                                              | 25.0                                                                              |                                                                                   | 25.0                                                                              | 25.0                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.44                                                                              | 0.44                                                                              |                                                                                   | 0.44                                                                              | 0.44                                                                              |                                                                                   |                                                                                    | 0.35                                                                                |                                                                                     |                                                                                     | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 146                                                                               | 784                                                                               |                                                                                   | 315                                                                               | 782                                                                               |                                                                                   |                                                                                    | 592                                                                                 |                                                                                     |                                                                                     | 549                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.25                                                                              |                                                                                   |                                                                                   | c0.38                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.04                                                                              |                                                                                   |                                                                                   | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.15                                                                                |                                                                                     |                                                                                     | c0.18                                                                               |                                                                                     |
| v/c Ratio                         | 0.10                                                                              | 0.58                                                                              |                                                                                   | 0.18                                                                              | 0.87                                                                              |                                                                                   |                                                                                    | 0.42                                                                                |                                                                                     |                                                                                     | 0.52                                                                                |                                                                                     |
| Uniform Delay, d1                 | 9.4                                                                               | 12.1                                                                              |                                                                                   | 9.8                                                                               | 14.6                                                                              |                                                                                   |                                                                                    | 14.1                                                                                |                                                                                     |                                                                                     | 14.7                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.3                                                                               | 1.1                                                                               |                                                                                   | 0.3                                                                               | 10.0                                                                              |                                                                                   |                                                                                    | 2.2                                                                                 |                                                                                     |                                                                                     | 3.5                                                                                 |                                                                                     |
| Delay (s)                         | 9.8                                                                               | 13.2                                                                              |                                                                                   | 10.1                                                                              | 24.6                                                                              |                                                                                   |                                                                                    | 16.3                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.1                                                                              |                                                                                   |                                                                                   | 23.5                                                                              |                                                                                   |                                                                                    | 16.3                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 18.7                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 57.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 86.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT   | WBR  | NBL                       | NBT   | NBR  | SBL   | SBT  | SBR  |
|-----------------------------------|------|------|-------|------|-------|------|---------------------------|-------|------|-------|------|------|
| Lane Configurations               |      | ↑↑   |       | ↑    | ↑     | ↑    |                           | ↑     | ↑    | ↑↑    | ↑    |      |
| Traffic Volume (vph)              | 0    | 695  | 4     | 224  | 971   | 609  | 0                         | 85    | 179  | 240   | 73   | 46   |
| Future Volume (vph)               | 0    | 695  | 4     | 224  | 971   | 609  | 0                         | 85    | 179  | 240   | 73   | 46   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900 | 1900  | 1900 | 1900                      | 1900  | 1900 | 1900  | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Lane Util. Factor                 |      | 0.95 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.97  | 1.00 |      |
| Frt                               |      | 1.00 |       | 1.00 | 1.00  | 0.85 |                           | 1.00  | 0.85 | 1.00  | 0.94 |      |
| Flt Protected                     |      | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (prot)                 |      | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1696 |      |
| Flt Permitted                     |      | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (perm)                 |      | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1696 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00 | 1.00  | 1.00 | 1.00                      | 1.00  | 1.00 | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 695  | 4     | 224  | 971   | 609  | 0                         | 85    | 179  | 240   | 73   | 46   |
| RTOR Reduction (vph)              | 0    | 1    | 0     | 0    | 0     | 0    | 0                         | 0     | 159  | 0     | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 698  | 0     | 224  | 971   | 609  | 0                         | 85    | 20   | 240   | 119  | 0    |
| Turn Type                         |      | NA   |       | Prot | NA    | Prot |                           | NA    | Perm | Prot  | NA   |      |
| Protected Phases                  |      | 4    |       | 3    | 8     | 8    |                           | 2     |      | 1     | 6    |      |
| Permitted Phases                  |      |      |       |      |       |      |                           |       | 2    |       |      |      |
| Actuated Green, G (s)             |      | 27.1 |       | 13.9 | 47.0  | 47.0 |                           | 9.3   | 9.3  | 7.1   | 22.4 |      |
| Effective Green, g (s)            |      | 27.1 |       | 13.9 | 47.0  | 47.0 |                           | 9.3   | 9.3  | 7.1   | 22.4 |      |
| Actuated g/C Ratio                |      | 0.33 |       | 0.17 | 0.58  | 0.58 |                           | 0.11  | 0.11 | 0.09  | 0.28 |      |
| Clearance Time (s)                |      | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  |       | 3.0  | 3.0   | 3.0  |                           | 3.0   | 3.0  | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)                |      | 1137 |       | 292  | 1039  | 883  |                           | 205   | 174  | 289   | 466  |      |
| v/s Ratio Prot                    |      | 0.20 |       | 0.13 | c0.54 | 0.40 |                           | c0.05 |      | c0.07 | 0.07 |      |
| v/s Ratio Perm                    |      |      |       |      |       |      |                           |       | 0.01 |       |      |      |
| v/c Ratio                         |      | 0.61 |       | 0.77 | 0.93  | 0.69 |                           | 0.41  | 0.12 | 0.83  | 0.26 |      |
| Uniform Delay, d1                 |      | 22.8 |       | 32.2 | 15.8  | 12.1 |                           | 33.5  | 32.4 | 36.6  | 23.0 |      |
| Progression Factor                |      | 1.00 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 1.00  | 1.00 |      |
| Incremental Delay, d2             |      | 2.5  |       | 11.4 | 16.0  | 4.4  |                           | 1.4   | 0.3  | 18.0  | 0.3  |      |
| Delay (s)                         |      | 25.3 |       | 43.6 | 31.8  | 16.5 |                           | 34.9  | 32.7 | 54.5  | 23.3 |      |
| Level of Service                  |      | C    |       | D    | C     | B    |                           | C     | C    | D     | C    |      |
| Approach Delay (s)                |      | 25.3 |       |      | 28.1  |      |                           | 33.4  |      |       | 44.2 |      |
| Approach LOS                      |      | C    |       |      | C     |      |                           | C     |      |       | D    |      |
| <b>Intersection Summary</b>       |      |      |       |      |       |      |                           |       |      |       |      |      |
| HCM 2000 Control Delay            |      |      | 29.8  |      |       |      | HCM 2000 Level of Service |       |      | C     |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.93  |      |       |      |                           |       |      |       |      |      |
| Actuated Cycle Length (s)         |      |      | 81.4  |      |       |      | Sum of lost time (s)      |       |      | 24.0  |      |      |
| Intersection Capacity Utilization |      |      | 74.6% |      |       |      | ICU Level of Service      |       |      | D     |      |      |
| Analysis Period (min)             |      |      | 15    |      |       |      |                           |       |      |       |      |      |
| c Critical Lane Group             |      |      |       |      |       |      |                           |       |      |       |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 3: Pine St &amp; Bank St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |
| Traffic Volume (vph)              | 123                                                                               | 0                                                                                 | 3                                                                                 | 115                                                                               | 0                                                                                 | 18                                                                                |
| Future Volume (vph)               | 123                                                                               | 0                                                                                 | 3                                                                                 | 115                                                                               | 0                                                                                 | 18                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Frt                               | 1.00                                                                              |                                                                                   | 0.87                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              |                                                                                   | 1564                                                                              |                                                                                   |                                                                                   | 1801                                                                              |
| Flt Permitted                     | 0.95                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              |                                                                                   | 1564                                                                              |                                                                                   |                                                                                   | 1801                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 123                                                                               | 0                                                                                 | 3                                                                                 | 115                                                                               | 0                                                                                 | 18                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 46                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Lane Group Flow (vph)             | 123                                                                               | 0                                                                                 | 72                                                                                | 0                                                                                 | 0                                                                                 | 18                                                                                |
| Turn Type                         | Prot                                                                              |                                                                                   | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |
| Permitted Phases                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |
| Actuated Green, G (s)             | 5.6                                                                               |                                                                                   | 26.7                                                                              |                                                                                   |                                                                                   | 26.7                                                                              |
| Effective Green, g (s)            | 5.6                                                                               |                                                                                   | 26.7                                                                              |                                                                                   |                                                                                   | 26.7                                                                              |
| Actuated g/C Ratio                | 0.13                                                                              |                                                                                   | 0.60                                                                              |                                                                                   |                                                                                   | 0.60                                                                              |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |
| Lane Grp Cap (vph)                | 216                                                                               |                                                                                   | 942                                                                               |                                                                                   |                                                                                   | 1085                                                                              |
| v/s Ratio Prot                    | c0.07                                                                             |                                                                                   | c0.05                                                                             |                                                                                   |                                                                                   | 0.01                                                                              |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.57                                                                              |                                                                                   | 0.08                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |
| Uniform Delay, d1                 | 18.2                                                                              |                                                                                   | 3.7                                                                               |                                                                                   |                                                                                   | 3.5                                                                               |
| Progression Factor                | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Incremental Delay, d2             | 3.4                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |
| Delay (s)                         | 21.6                                                                              |                                                                                   | 3.8                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |
| Level of Service                  | C                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |
| Approach Delay (s)                | 21.6                                                                              |                                                                                   | 3.8                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |
| Approach LOS                      | C                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 12.3                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.16                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 44.3                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 24.1%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 4: Pine St &amp; Cherry St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 87                                                                                | 114                                                                               | 0                                                                                 | 0                                                                                 | 121                                                                               | 256                                                                               | 0                                                                                  | 3                                                                                   | 0                                                                                   | 74                                                                                  | 18                                                                                  | 33                                                                                  |
| Future Volume (vph)               | 87                                                                                | 114                                                                               | 0                                                                                 | 0                                                                                 | 121                                                                               | 256                                                                               | 0                                                                                  | 3                                                                                   | 0                                                                                   | 74                                                                                  | 18                                                                                  | 33                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.91                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1763                                                                              |                                                                                   |                                                                                   | 1636                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1687                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.56                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.84                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1013                                                                              |                                                                                   |                                                                                   | 1636                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1461                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 87                                                                                | 114                                                                               | 0                                                                                 | 0                                                                                 | 121                                                                               | 256                                                                               | 0                                                                                  | 3                                                                                   | 0                                                                                   | 74                                                                                  | 18                                                                                  | 33                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 177                                                                               | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 18                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 201                                                                               | 0                                                                                 | 0                                                                                 | 200                                                                               | 0                                                                                 | 0                                                                                  | 3                                                                                   | 0                                                                                   | 0                                                                                   | 107                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   |                                                                                    | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                    | 19.2                                                                                |                                                                                     |                                                                                     | 19.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                    | 19.2                                                                                |                                                                                     |                                                                                     | 19.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                    | 0.44                                                                                |                                                                                     |                                                                                     | 0.44                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 284                                                                               |                                                                                   |                                                                                   | 459                                                                               |                                                                                   |                                                                                    | 796                                                                                 |                                                                                     |                                                                                     | 646                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.12                                                                              |                                                                                   |                                                                                    | 0.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.20                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.07                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    | 0.00                                                                                |                                                                                     |                                                                                     | 0.17                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 14.0                                                                              |                                                                                   |                                                                                   | 12.8                                                                              |                                                                                   |                                                                                    | 6.8                                                                                 |                                                                                     |                                                                                     | 7.3                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 7.8                                                                               |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 21.8                                                                              |                                                                                   |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                    | 6.8                                                                                 |                                                                                     |                                                                                     | 7.8                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 21.8                                                                              |                                                                                   |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                    | 6.8                                                                                 |                                                                                     |                                                                                     | 7.8                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 14.8                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 43.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 61.6%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |  |  |  |                                                                                   |  |
| Traffic Volume (vph)              | 151                                                                               | 166                                                                               | 835                                                                               | 486                                                                               | 176                                                                               | 625                                                                               |
| Future Volume (vph)               | 151                                                                               | 166                                                                               | 835                                                                               | 486                                                                               | 176                                                                               | 625                                                                               |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                                                                                   | 0.95                                                                              |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                                                                                   | 3384                                                                              |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.56                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                                                                                   | 1899                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 151                                                                               | 166                                                                               | 835                                                                               | 486                                                                               | 176                                                                               | 625                                                                               |
| RTOR Reduction (vph)              | 0                                                                                 | 98                                                                                | 0                                                                                 | 196                                                                               | 0                                                                                 | 0                                                                                 |
| Lane Group Flow (vph)             | 151                                                                               | 68                                                                                | 835                                                                               | 290                                                                               | 0                                                                                 | 801                                                                               |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |
| Actuated Green, G (s)             | 10.1                                                                              | 10.1                                                                              | 32.8                                                                              | 32.8                                                                              |                                                                                   | 32.8                                                                              |
| Effective Green, g (s)            | 10.1                                                                              | 10.1                                                                              | 32.8                                                                              | 32.8                                                                              |                                                                                   | 32.8                                                                              |
| Actuated g/C Ratio                | 0.18                                                                              | 0.18                                                                              | 0.60                                                                              | 0.60                                                                              |                                                                                   | 0.60                                                                              |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |
| Lane Grp Cap (vph)                | 314                                                                               | 281                                                                               | 1076                                                                              | 1609                                                                              |                                                                                   | 1134                                                                              |
| v/s Ratio Prot                    | c0.09                                                                             |                                                                                   | c0.46                                                                             |                                                                                   |                                                                                   |                                                                                   |
| v/s Ratio Perm                    |                                                                                   | 0.04                                                                              |                                                                                   | 0.11                                                                              |                                                                                   | 0.42                                                                              |
| v/c Ratio                         | 0.48                                                                              | 0.24                                                                              | 0.78                                                                              | 0.18                                                                              |                                                                                   | 0.71                                                                              |
| Uniform Delay, d1                 | 20.1                                                                              | 19.1                                                                              | 8.3                                                                               | 5.0                                                                               |                                                                                   | 7.7                                                                               |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |
| Incremental Delay, d2             | 1.2                                                                               | 0.4                                                                               | 5.5                                                                               | 0.2                                                                               |                                                                                   | 3.7                                                                               |
| Delay (s)                         | 21.2                                                                              | 19.6                                                                              | 13.8                                                                              | 5.2                                                                               |                                                                                   | 11.4                                                                              |
| Level of Service                  | C                                                                                 | B                                                                                 | B                                                                                 | A                                                                                 |                                                                                   | B                                                                                 |
| Approach Delay (s)                | 20.4                                                                              |                                                                                   | 10.6                                                                              |                                                                                   |                                                                                   | 11.4                                                                              |
| Approach LOS                      | C                                                                                 |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 12.2                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 54.9                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 89.7%                                                                             |                                                                                   | ICU Level of Service                                                              | E                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (vph)              | 422                                                                               | 43                                                                                | 75                                                                                | 445                                                                               | 90                                                                                | 155                                                                               |
| Future Volume (vph)               | 422                                                                               | 43                                                                                | 75                                                                                | 445                                                                               | 90                                                                                | 155                                                                               |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Frt                               | 0.99                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.91                                                                              |                                                                                   |
| Flt Protected                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (prot)                 | 1778                                                                              |                                                                                   |                                                                                   | 1788                                                                              | 1617                                                                              |                                                                                   |
| Flt Permitted                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.79                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (perm)                 | 1778                                                                              |                                                                                   |                                                                                   | 1422                                                                              | 1617                                                                              |                                                                                   |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 422                                                                               | 43                                                                                | 75                                                                                | 445                                                                               | 90                                                                                | 155                                                                               |
| RTOR Reduction (vph)              | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 100                                                                               | 0                                                                                 |
| Lane Group Flow (vph)             | 458                                                                               | 0                                                                                 | 0                                                                                 | 520                                                                               | 145                                                                               | 0                                                                                 |
| Turn Type                         | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Prot                                                                              |                                                                                   |
| Protected Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2                                                                                 |                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Actuated Green, G (s)             | 21.0                                                                              |                                                                                   |                                                                                   | 21.0                                                                              | 18.2                                                                              |                                                                                   |
| Effective Green, g (s)            | 21.0                                                                              |                                                                                   |                                                                                   | 21.0                                                                              | 18.2                                                                              |                                                                                   |
| Actuated g/C Ratio                | 0.41                                                                              |                                                                                   |                                                                                   | 0.41                                                                              | 0.36                                                                              |                                                                                   |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |
| Lane Grp Cap (vph)                | 729                                                                               |                                                                                   |                                                                                   | 583                                                                               | 574                                                                               |                                                                                   |
| v/s Ratio Prot                    | 0.26                                                                              |                                                                                   |                                                                                   |                                                                                   | c0.09                                                                             |                                                                                   |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | c0.37                                                                             |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.63                                                                              |                                                                                   |                                                                                   | 0.89                                                                              | 0.25                                                                              |                                                                                   |
| Uniform Delay, d1                 | 12.0                                                                              |                                                                                   |                                                                                   | 14.0                                                                              | 11.7                                                                              |                                                                                   |
| Progression Factor                | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Incremental Delay, d2             | 1.7                                                                               |                                                                                   |                                                                                   | 15.8                                                                              | 1.1                                                                               |                                                                                   |
| Delay (s)                         | 13.7                                                                              |                                                                                   |                                                                                   | 29.9                                                                              | 12.7                                                                              |                                                                                   |
| Level of Service                  | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| Approach Delay (s)                | 13.7                                                                              |                                                                                   |                                                                                   | 29.9                                                                              | 12.7                                                                              |                                                                                   |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 20.4                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | C                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.59                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 51.2                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 81.9%                                                                             |                                                                                   | ICU Level of Service                                                              | D                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

| Movement                          | EBL  | EBT   | EBR   | WBL   | WBT  | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|-------|-------|-------|------|---------------------------|-------|------|------|------|------|------|
| Lane Configurations               |      | ↑     | ↑     | ↑     | ↑    |                           | ↑     |      | ↑    | ↑    | ↑↓   |      |
| Traffic Volume (vph)              | 0    | 371   | 114   | 209   | 436  | 0                         | 195   | 0    | 314  | 104  | 312  | 50   |
| Future Volume (vph)               | 0    | 371   | 114   | 209   | 436  | 0                         | 195   | 0    | 314  | 104  | 312  | 50   |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900  | 1900  | 1900 | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0   | 6.0   | 6.0   | 6.0  |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Lane Util. Factor                 |      | 1.00  | 1.00  | 1.00  | 1.00 |                           | 1.00  |      | 1.00 | 1.00 | 0.95 |      |
| Frt                               |      | 1.00  | 0.85  | 1.00  | 1.00 |                           | 1.00  |      | 0.85 | 1.00 | 0.98 |      |
| Flt Protected                     |      | 1.00  | 1.00  | 0.95  | 1.00 |                           | 0.95  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (prot)                 |      | 1801  | 1531  | 1711  | 1801 |                           | 1711  |      | 1531 | 1711 | 3350 |      |
| Flt Permitted                     |      | 1.00  | 1.00  | 0.95  | 1.00 |                           | 0.54  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (perm)                 |      | 1801  | 1531  | 1711  | 1801 |                           | 965   |      | 1531 | 1711 | 3350 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 371   | 114   | 209   | 436  | 0                         | 195   | 0    | 314  | 104  | 312  | 50   |
| RTOR Reduction (vph)              | 0    | 0     | 0     | 0     | 0    | 0                         | 0     | 0    | 216  | 0    | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 371   | 114   | 209   | 436  | 0                         | 195   | 0    | 98   | 104  | 362  | 0    |
| Turn Type                         |      | NA    | Perm  | Prot  | NA   |                           | Perm  |      | Perm | Perm | NA   |      |
| Protected Phases                  |      | 4     |       | 3     | 8    |                           |       |      |      |      | 6    |      |
| Permitted Phases                  |      |       | 4     |       |      |                           | 2     |      | 2    | 6    |      |      |
| Actuated Green, G (s)             |      | 15.7  | 15.7  | 6.0   | 27.7 |                           | 18.0  |      | 18.0 | 18.0 | 18.0 |      |
| Effective Green, g (s)            |      | 15.7  | 15.7  | 6.0   | 27.7 |                           | 18.0  |      | 18.0 | 18.0 | 18.0 |      |
| Actuated g/C Ratio                |      | 0.27  | 0.27  | 0.10  | 0.48 |                           | 0.31  |      | 0.31 | 0.31 | 0.31 |      |
| Clearance Time (s)                |      | 6.0   | 6.0   | 6.0   | 6.0  |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0   | 3.0   | 3.0   | 3.0  |                           | 3.0   |      | 3.0  | 3.0  | 3.0  |      |
| Lane Grp Cap (vph)                |      | 490   | 416   | 177   | 864  |                           | 301   |      | 477  | 533  | 1045 |      |
| v/s Ratio Prot                    |      | c0.21 |       | c0.12 | 0.24 |                           |       |      |      |      | 0.11 |      |
| v/s Ratio Perm                    |      |       | 0.07  |       |      |                           | c0.20 |      | 0.06 | 0.06 |      |      |
| v/c Ratio                         |      | 0.76  | 0.27  | 1.18  | 0.50 |                           | 0.65  |      | 0.21 | 0.20 | 0.35 |      |
| Uniform Delay, d1                 |      | 19.3  | 16.5  | 25.9  | 10.3 |                           | 17.1  |      | 14.6 | 14.5 | 15.3 |      |
| Progression Factor                |      | 1.00  | 1.00  | 1.00  | 1.00 |                           | 1.00  |      | 1.00 | 1.00 | 1.00 |      |
| Incremental Delay, d2             |      | 6.6   | 0.4   | 124.7 | 0.5  |                           | 10.3  |      | 1.0  | 0.8  | 0.9  |      |
| Delay (s)                         |      | 25.8  | 16.9  | 150.5 | 10.8 |                           | 27.4  |      | 15.6 | 15.4 | 16.2 |      |
| Level of Service                  |      | C     | B     | F     | B    |                           | C     |      | B    | B    | B    |      |
| Approach Delay (s)                |      | 23.7  |       |       | 56.1 |                           |       | 20.1 |      |      | 16.0 |      |
| Approach LOS                      |      | C     |       |       | E    |                           |       | C    |      |      | B    |      |
| <b>Intersection Summary</b>       |      |       |       |       |      |                           |       |      |      |      |      |      |
| HCM 2000 Control Delay            |      |       | 31.1  |       |      | HCM 2000 Level of Service |       |      | C    |      |      |      |
| HCM 2000 Volume to Capacity ratio |      |       | 0.77  |       |      |                           |       |      |      |      |      |      |
| Actuated Cycle Length (s)         |      |       | 57.7  |       |      | Sum of lost time (s)      |       |      | 18.0 |      |      |      |
| Intersection Capacity Utilization |      |       | 70.5% |       |      | ICU Level of Service      |       |      | C    |      |      |      |
| Analysis Period (min)             |      |       | 15    |       |      |                           |       |      |      |      |      |      |
| c Critical Lane Group             |      |       |       |       |      |                           |       |      |      |      |      |      |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 163                                                                               | 577                                                                               | 0                                                                                 | 0                                                                                 | 565                                                                               | 63                                                                                | 51                                                                                  | 302                                                                                 | 54                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 163                                                                               | 577                                                                               | 0                                                                                 | 0                                                                                 | 565                                                                               | 63                                                                                | 51                                                                                  | 302                                                                                 | 54                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                                | 0.98                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1776                                                                              |                                                                                   | 1711                                                                                | 1760                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.23                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 422                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1776                                                                              |                                                                                   | 1711                                                                                | 1760                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 163                                                                               | 577                                                                               | 0                                                                                 | 0                                                                                 | 565                                                                               | 63                                                                                | 51                                                                                  | 302                                                                                 | 54                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                   | 10                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 163                                                                               | 577                                                                               | 0                                                                                 | 0                                                                                 | 621                                                                               | 0                                                                                 | 51                                                                                  | 346                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 23.8                                                                              | 23.8                                                                              |                                                                                   |                                                                                   | 23.8                                                                              |                                                                                   | 19.2                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 23.8                                                                              | 23.8                                                                              |                                                                                   |                                                                                   | 23.8                                                                              |                                                                                   | 19.2                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.43                                                                              | 0.43                                                                              |                                                                                   |                                                                                   | 0.43                                                                              |                                                                                   | 0.35                                                                                | 0.35                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 182                                                                               | 779                                                                               |                                                                                   |                                                                                   | 768                                                                               |                                                                                   | 597                                                                                 | 614                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.32                                                                              |                                                                                   |                                                                                   | 0.35                                                                              |                                                                                   |                                                                                     | c0.20                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | c0.39                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.03                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.90                                                                              | 0.74                                                                              |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   | 0.09                                                                                | 0.56                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 14.4                                                                              | 13.0                                                                              |                                                                                   |                                                                                   | 13.6                                                                              |                                                                                   | 12.0                                                                                | 14.5                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 38.4                                                                              | 3.8                                                                               |                                                                                   |                                                                                   | 6.3                                                                               |                                                                                   | 0.3                                                                                 | 3.7                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 52.9                                                                              | 16.8                                                                              |                                                                                   |                                                                                   | 19.9                                                                              |                                                                                   | 12.3                                                                                | 18.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | D                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 24.8                                                                              |                                                                                   |                                                                                   | 19.9                                                                              |                                                                                   |                                                                                     | 17.5                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 21.4                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.75                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 55.0                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 76.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                                                                    |  |       |        |      |      |      |      |       |      |      |      |      |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------|--------|------|------|------|------|-------|------|------|------|------|
| Movement                                                                           | EBL                                                                                | EBT   | EBR    | WBL  | WBT  | WBR  | NBL  | NBT   | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations                                                                |                                                                                    | ↔     |        | ↔    | ↔    |      |      | ↔     |      |      | ↔    |      |
| Traffic Volume (vph)                                                               | 63                                                                                 | 554   | 45     | 58   | 543  | 46   | 65   | 263   | 57   | 29   | 189  | 38   |
| Future Volume (vph)                                                                | 63                                                                                 | 554   | 45     | 58   | 543  | 46   | 65   | 263   | 57   | 29   | 189  | 38   |
| Ideal Flow (vphpl)                                                                 | 1900                                                                               | 1900  | 1900   | 1900 | 1900 | 1900 | 1900 | 1900  | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)                                                                |                                                                                    | 6.0   |        | 6.0  | 6.0  |      |      | 6.0   |      |      | 6.0  |      |
| Lane Util. Factor                                                                  |                                                                                    | 1.00  |        | 1.00 | 1.00 |      |      | 1.00  |      |      | 1.00 |      |
| Frt                                                                                |                                                                                    | 0.99  |        | 1.00 | 0.99 |      |      | 0.98  |      |      | 0.98 |      |
| Flt Protected                                                                      |                                                                                    | 1.00  |        | 0.95 | 1.00 |      |      | 0.99  |      |      | 0.99 |      |
| Satd. Flow (prot)                                                                  |                                                                                    | 1776  |        | 1711 | 1780 |      |      | 1750  |      |      | 1755 |      |
| Flt Permitted                                                                      |                                                                                    | 0.84  |        | 0.37 | 1.00 |      |      | 0.90  |      |      | 0.93 |      |
| Satd. Flow (perm)                                                                  |                                                                                    | 1491  |        | 668  | 1780 |      |      | 1585  |      |      | 1637 |      |
| Peak-hour factor, PHF                                                              | 1.00                                                                               | 1.00  | 1.00   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                                                                    | 63                                                                                 | 554   | 45     | 58   | 543  | 46   | 65   | 263   | 57   | 29   | 189  | 38   |
| RTOR Reduction (vph)                                                               | 0                                                                                  | 5     | 0      | 0    | 5    | 0    | 0    | 11    | 0    | 0    | 11   | 0    |
| Lane Group Flow (vph)                                                              | 0                                                                                  | 658   | 0      | 58   | 584  | 0    | 0    | 375   | 0    | 0    | 246  | 0    |
| Turn Type                                                                          | Perm                                                                               | NA    |        | Perm | NA   |      | Perm | NA    |      | Perm | NA   |      |
| Protected Phases                                                                   |                                                                                    | 4     |        |      | 8    |      |      | 2     |      |      | 6    |      |
| Permitted Phases                                                                   | 4                                                                                  |       |        | 8    |      |      | 2    |       |      | 6    |      |      |
| Actuated Green, G (s)                                                              |                                                                                    | 30.0  |        | 30.0 | 30.0 |      |      | 18.0  |      |      | 18.0 |      |
| Effective Green, g (s)                                                             |                                                                                    | 30.0  |        | 30.0 | 30.0 |      |      | 18.0  |      |      | 18.0 |      |
| Actuated g/C Ratio                                                                 |                                                                                    | 0.50  |        | 0.50 | 0.50 |      |      | 0.30  |      |      | 0.30 |      |
| Clearance Time (s)                                                                 |                                                                                    | 6.0   |        | 6.0  | 6.0  |      |      | 6.0   |      |      | 6.0  |      |
| Vehicle Extension (s)                                                              |                                                                                    | 3.0   |        | 3.0  | 3.0  |      |      | 3.0   |      |      | 3.0  |      |
| Lane Grp Cap (vph)                                                                 |                                                                                    | 745   |        | 334  | 890  |      |      | 475   |      |      | 491  |      |
| v/s Ratio Prot                                                                     |                                                                                    |       |        |      | 0.33 |      |      |       |      |      |      |      |
| v/s Ratio Perm                                                                     |                                                                                    | c0.44 |        | 0.09 |      |      |      | c0.24 |      |      | 0.15 |      |
| v/c Ratio                                                                          |                                                                                    | 0.88  |        | 0.17 | 0.66 |      |      | 0.79  |      |      | 0.50 |      |
| Uniform Delay, d1                                                                  |                                                                                    | 13.4  |        | 8.2  | 11.2 |      |      | 19.3  |      |      | 17.3 |      |
| Progression Factor                                                                 |                                                                                    | 1.00  |        | 1.00 | 1.00 |      |      | 1.00  |      |      | 1.00 |      |
| Incremental Delay, d2                                                              |                                                                                    | 14.3  |        | 1.1  | 3.8  |      |      | 12.5  |      |      | 3.6  |      |
| Delay (s)                                                                          |                                                                                    | 27.7  |        | 9.3  | 14.9 |      |      | 31.7  |      |      | 20.9 |      |
| Level of Service                                                                   |                                                                                    | C     |        | A    | B    |      |      | C     |      |      | C    |      |
| Approach Delay (s)                                                                 |                                                                                    | 27.7  |        |      | 14.4 |      |      | 31.7  |      |      | 20.9 |      |
| Approach LOS                                                                       |                                                                                    | C     |        |      | B    |      |      | C     |      |      | C    |      |
| <b>Intersection Summary</b>                                                        |                                                                                    |       |        |      |      |      |      |       |      |      |      |      |
| HCM 2000 Control Delay                                                             |                                                                                    |       | 23.2   |      |      |      |      |       |      |      |      |      |
| HCM 2000 Volume to Capacity ratio                                                  |                                                                                    |       | 0.85   |      |      |      |      |       |      |      |      |      |
| Actuated Cycle Length (s)                                                          |                                                                                    |       | 60.0   |      |      |      |      |       |      |      |      |      |
| Intersection Capacity Utilization                                                  |                                                                                    |       | 113.6% |      |      |      |      |       |      |      |      |      |
| Analysis Period (min)                                                              |                                                                                    |       | 15     |      |      |      |      |       |      |      |      |      |
| c Critical Lane Group                                                              |                                                                                    |       |        |      |      |      |      |       |      |      |      |      |
| HCM 2000 Level of Service C<br>Sum of lost time (s) 12.0<br>ICU Level of Service H |                                                                                    |       |        |      |      |      |      |       |      |      |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |  |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 535                                                                               | 57                                                                                | 146                                                                               | 608                                                                               | 89                                                                                | 151                                                                                 | 252                                                                                 | 187                                                                                 | 27                                                                                  | 115                                                                                 | 12                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 535                                                                               | 57                                                                                | 146                                                                               | 608                                                                               | 89                                                                                | 151                                                                                 | 252                                                                                 | 187                                                                                 | 27                                                                                  | 115                                                                                 | 12                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.98                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1777                                                                              |                                                                                   | 1711                                                                              | 1766                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.17                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1777                                                                              |                                                                                   | 301                                                                               | 1766                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1766                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 535                                                                               | 57                                                                                | 146                                                                               | 608                                                                               | 89                                                                                | 151                                                                                 | 252                                                                                 | 187                                                                                 | 27                                                                                  | 115                                                                                 | 12                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 153                                                                                 | 0                                                                                   | 3                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 588                                                                               | 0                                                                                 | 146                                                                               | 697                                                                               | 0                                                                                 | 151                                                                                 | 252                                                                                 | 34                                                                                  | 0                                                                                   | 151                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     | Split                                                                               | NA                                                                                  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   | 6                                                                                   |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 30.1                                                                              |                                                                                   | 41.2                                                                              | 41.2                                                                              |                                                                                   | 16.2                                                                                | 16.2                                                                                | 16.2                                                                                |                                                                                     | 12.7                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 30.1                                                                              |                                                                                   | 41.2                                                                              | 41.2                                                                              |                                                                                   | 16.2                                                                                | 16.2                                                                                | 16.2                                                                                |                                                                                     | 12.7                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.34                                                                              |                                                                                   | 0.47                                                                              | 0.47                                                                              |                                                                                   | 0.18                                                                                | 0.18                                                                                | 0.18                                                                                |                                                                                     | 0.14                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 607                                                                               |                                                                                   | 222                                                                               | 825                                                                               |                                                                                   | 314                                                                                 | 331                                                                                 | 281                                                                                 |                                                                                     | 254                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.33                                                                             |                                                                                   | 0.04                                                                              | c0.39                                                                             |                                                                                   | 0.09                                                                                | c0.14                                                                               |                                                                                     |                                                                                     | c0.09                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.97                                                                              |                                                                                   | 0.66                                                                              | 0.84                                                                              |                                                                                   | 0.48                                                                                | 0.76                                                                                | 0.12                                                                                |                                                                                     | 0.59                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 28.5                                                                              |                                                                                   | 32.8                                                                              | 20.6                                                                              |                                                                                   | 32.2                                                                                | 34.1                                                                                | 30.0                                                                                |                                                                                     | 35.3                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 29.6                                                                              |                                                                                   | 6.9                                                                               | 10.3                                                                              |                                                                                   | 1.2                                                                                 | 9.9                                                                                 | 0.2                                                                                 |                                                                                     | 3.7                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 58.1                                                                              |                                                                                   | 39.6                                                                              | 31.0                                                                              |                                                                                   | 33.3                                                                                | 44.0                                                                                | 30.2                                                                                |                                                                                     | 39.0                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | E                                                                                 |                                                                                   | D                                                                                 | C                                                                                 |                                                                                   | C                                                                                   | D                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 58.1                                                                              |                                                                                   |                                                                                   | 32.5                                                                              |                                                                                   |                                                                                     | 36.9                                                                                |                                                                                     |                                                                                     | 39.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 41.1                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 110.6%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 16                                                                                | 361                                                                               | 88                                                                                | 76                                                                                | 454                                                                               | 95                                                                                | 55                                                                                 | 111                                                                                 | 56                                                                                  | 144                                                                                 | 230                                                                                 | 22                                                                                  |
| Future Volume (vph)               | 16                                                                                | 361                                                                               | 88                                                                                | 76                                                                                | 454                                                                               | 95                                                                                | 55                                                                                 | 111                                                                                 | 56                                                                                  | 144                                                                                 | 230                                                                                 | 22                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1752                                                                              |                                                                                   |                                                                                   | 1753                                                                              |                                                                                   |                                                                                    | 1771                                                                                | 1531                                                                                |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.90                                                                              |                                                                                   |                                                                                    | 0.80                                                                                | 1.00                                                                                |                                                                                     | 0.81                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1705                                                                              |                                                                                   |                                                                                   | 1584                                                                              |                                                                                   |                                                                                    | 1439                                                                                | 1531                                                                                |                                                                                     | 1450                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 16                                                                                | 361                                                                               | 88                                                                                | 76                                                                                | 454                                                                               | 95                                                                                | 55                                                                                 | 111                                                                                 | 56                                                                                  | 144                                                                                 | 230                                                                                 | 22                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 36                                                                                  | 0                                                                                   | 3                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 450                                                                               | 0                                                                                 | 0                                                                                 | 614                                                                               | 0                                                                                 | 0                                                                                  | 166                                                                                 | 20                                                                                  | 0                                                                                   | 393                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 25.0                                                                              |                                                                                   |                                                                                   | 25.0                                                                              |                                                                                   |                                                                                    | 20.1                                                                                | 20.1                                                                                |                                                                                     | 20.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 25.0                                                                              |                                                                                   |                                                                                   | 25.0                                                                              |                                                                                   |                                                                                    | 20.1                                                                                | 20.1                                                                                |                                                                                     | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.35                                                                                |                                                                                     | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 746                                                                               |                                                                                   |                                                                                   | 693                                                                               |                                                                                   |                                                                                    | 506                                                                                 | 538                                                                                 |                                                                                     | 510                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.26                                                                              |                                                                                   |                                                                                   | c0.39                                                                             |                                                                                   |                                                                                    | 0.12                                                                                | 0.01                                                                                |                                                                                     | c0.27                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.60                                                                              |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                    | 0.33                                                                                | 0.04                                                                                |                                                                                     | 0.77                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 12.3                                                                              |                                                                                   |                                                                                   | 14.7                                                                              |                                                                                   |                                                                                    | 13.6                                                                                | 12.1                                                                                |                                                                                     | 16.4                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.4                                                                               |                                                                                   |                                                                                   | 13.0                                                                              |                                                                                   |                                                                                    | 1.7                                                                                 | 0.1                                                                                 |                                                                                     | 10.7                                                                                |                                                                                     |
| Delay (s)                         |                                                                                   | 13.7                                                                              |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                    | 15.3                                                                                | 12.3                                                                                |                                                                                     | 27.2                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.7                                                                              |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                    | 14.5                                                                                |                                                                                     |                                                                                     | 27.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 22.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.83                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 57.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 101.8%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | G                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |  |  |  |
| Traffic Volume (vph)              | 16                                                                                | 395                                                                               | 105                                                                               | 62                                                                                | 402                                                                               | 92                                                                                | 100                                                                                | 114                                                                                 | 68                                                                                  | 142                                                                                 | 136                                                                                 | 14                                                                                  |
| Future Volume (vph)               | 16                                                                                | 395                                                                               | 105                                                                               | 62                                                                                | 402                                                                               | 92                                                                                | 100                                                                                | 114                                                                                 | 68                                                                                  | 142                                                                                 | 136                                                                                 | 14                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1797                                                                              | 1531                                                                              | 1711                                                                              | 1750                                                                              |                                                                                   |                                                                                    | 1760                                                                                | 1531                                                                                | 1711                                                                                | 1775                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.97                                                                              | 1.00                                                                              | 0.43                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.78                                                                                | 1.00                                                                                | 0.62                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1746                                                                              | 1531                                                                              | 773                                                                               | 1750                                                                              |                                                                                   |                                                                                    | 1413                                                                                | 1531                                                                                | 1124                                                                                | 1775                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 16                                                                                | 395                                                                               | 105                                                                               | 62                                                                                | 402                                                                               | 92                                                                                | 100                                                                                | 114                                                                                 | 68                                                                                  | 142                                                                                 | 136                                                                                 | 14                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 68                                                                                | 0                                                                                 | 17                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 42                                                                                  | 0                                                                                   | 7                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 411                                                                               | 37                                                                                | 62                                                                                | 477                                                                               | 0                                                                                 | 0                                                                                  | 214                                                                                 | 26                                                                                  | 142                                                                                 | 143                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 16.5                                                                              | 16.5                                                                              | 16.5                                                                              | 16.5                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 16.5                                                                              | 16.5                                                                              | 16.5                                                                              | 16.5                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.35                                                                              | 0.35                                                                              | 0.35                                                                              | 0.35                                                                              |                                                                                   |                                                                                    | 0.39                                                                                | 0.39                                                                                | 0.39                                                                                | 0.39                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 618                                                                               | 542                                                                               | 273                                                                               | 619                                                                               |                                                                                   |                                                                                    | 548                                                                                 | 594                                                                                 | 436                                                                                 | 689                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.27                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.08                                                                                |
| v/s Ratio Perm                    |                                                                                   | 0.24                                                                              | 0.02                                                                              | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.15                                                                               | 0.02                                                                                | 0.13                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.67                                                                              | 0.07                                                                              | 0.23                                                                              | 0.77                                                                              |                                                                                   |                                                                                    | 0.39                                                                                | 0.04                                                                                | 0.33                                                                                | 0.21                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 12.7                                                                              | 10.0                                                                              | 10.6                                                                              | 13.4                                                                              |                                                                                   |                                                                                    | 10.3                                                                                | 8.9                                                                                 | 10.0                                                                                | 9.5                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 2.7                                                                               | 0.1                                                                               | 0.4                                                                               | 5.8                                                                               |                                                                                   |                                                                                    | 2.1                                                                                 | 0.1                                                                                 | 2.0                                                                                 | 0.7                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 15.4                                                                              | 10.0                                                                              | 11.0                                                                              | 19.1                                                                              |                                                                                   |                                                                                    | 12.4                                                                                | 9.0                                                                                 | 12.0                                                                                | 10.2                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | A                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 14.3                                                                              |                                                                                   |                                                                                   | 18.2                                                                              |                                                                                   |                                                                                    | 11.6                                                                                |                                                                                     |                                                                                     | 11.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 14.6                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.57                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 46.6                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 86.1%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 94                                                                                | 554                                                                               | 41                                                                                | 94                                                                                | 567                                                                               | 169                                                                               | 7                                                                                  | 128                                                                                 | 48                                                                                  | 273                                                                                 | 389                                                                                 | 115                                                                                 |
| Future Volume (vph)               | 94                                                                                | 554                                                                               | 41                                                                                | 94                                                                                | 567                                                                               | 169                                                                               | 7                                                                                  | 128                                                                                 | 48                                                                                  | 273                                                                                 | 389                                                                                 | 115                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.96                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1625                                                                              | 1692                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1734                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.28                                                                              | 0.99                                                                              |                                                                                   | 0.22                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 0.71                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 486                                                                               | 1676                                                                              |                                                                                   | 391                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1704                                                                                |                                                                                     | 1285                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 94                                                                                | 554                                                                               | 41                                                                                | 94                                                                                | 567                                                                               | 169                                                                               | 7                                                                                  | 128                                                                                 | 48                                                                                  | 273                                                                                 | 389                                                                                 | 115                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 97                                                                                | 0                                                                                  | 20                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 74                                                                                  |
| Lane Group Flow (vph)             | 85                                                                                | 599                                                                               | 0                                                                                 | 94                                                                                | 567                                                                               | 72                                                                                | 0                                                                                  | 163                                                                                 | 0                                                                                   | 273                                                                                 | 389                                                                                 | 41                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 23.8                                                                              | 23.8                                                                              |                                                                                   | 23.8                                                                              | 23.8                                                                              | 23.8                                                                              |                                                                                    | 20.2                                                                                |                                                                                     | 20.2                                                                                | 20.2                                                                                | 20.2                                                                                |
| Effective Green, g (s)            | 23.8                                                                              | 23.8                                                                              |                                                                                   | 23.8                                                                              | 23.8                                                                              | 23.8                                                                              |                                                                                    | 20.2                                                                                |                                                                                     | 20.2                                                                                | 20.2                                                                                | 20.2                                                                                |
| Actuated g/C Ratio                | 0.43                                                                              | 0.43                                                                              |                                                                                   | 0.43                                                                              | 0.43                                                                              | 0.43                                                                              |                                                                                    | 0.36                                                                                |                                                                                     | 0.36                                                                                | 0.36                                                                                | 0.36                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 206                                                                               | 712                                                                               |                                                                                   | 166                                                                               | 765                                                                               | 650                                                                               |                                                                                    | 614                                                                                 |                                                                                     | 463                                                                                 | 649                                                                                 | 552                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.31                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.22                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.17                                                                              | c0.36                                                                             |                                                                                   | 0.24                                                                              |                                                                                   | 0.05                                                                              |                                                                                    | 0.10                                                                                |                                                                                     | 0.21                                                                                |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.41                                                                              | 0.84                                                                              |                                                                                   | 0.57                                                                              | 0.74                                                                              | 0.11                                                                              |                                                                                    | 0.26                                                                                |                                                                                     | 0.59                                                                                | 0.60                                                                                | 0.08                                                                                |
| Uniform Delay, d1                 | 11.2                                                                              | 14.4                                                                              |                                                                                   | 12.2                                                                              | 13.5                                                                              | 9.7                                                                               |                                                                                    | 12.7                                                                                |                                                                                     | 14.5                                                                                | 14.6                                                                                | 11.8                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 1.3                                                                               | 8.9                                                                               |                                                                                   | 4.4                                                                               | 3.9                                                                               | 0.1                                                                               |                                                                                    | 1.1                                                                                 |                                                                                     | 5.4                                                                                 | 4.1                                                                                 | 0.3                                                                                 |
| Delay (s)                         | 12.6                                                                              | 23.3                                                                              |                                                                                   | 16.6                                                                              | 17.4                                                                              | 9.8                                                                               |                                                                                    | 13.7                                                                                |                                                                                     | 20.0                                                                                | 18.7                                                                                | 12.0                                                                                |
| Level of Service                  | B                                                                                 | C                                                                                 |                                                                                   | B                                                                                 | B                                                                                 | A                                                                                 |                                                                                    | B                                                                                   |                                                                                     | B                                                                                   | B                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 22.0                                                                              |                                                                                   |                                                                                   | 15.8                                                                              |                                                                                   |                                                                                    | 13.7                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 18.1                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.73                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 56.0                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 109.8%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 47                                                                                | 864                                                                               | 0                                                                                 | 0                                                                                 | 701                                                                               | 37                                                                                | 47                                                                                 | 275                                                                                 | 111                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 47                                                                                | 864                                                                               | 0                                                                                 | 0                                                                                 | 701                                                                               | 37                                                                                | 47                                                                                 | 275                                                                                 | 111                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1788                                                                              |                                                                                   |                                                                                    | 1788                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.21                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 379                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1788                                                                              |                                                                                   |                                                                                    | 1788                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 47                                                                                | 864                                                                               | 0                                                                                 | 0                                                                                 | 701                                                                               | 37                                                                                | 47                                                                                 | 275                                                                                 | 111                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 79                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 47                                                                                | 864                                                                               | 0                                                                                 | 0                                                                                 | 735                                                                               | 0                                                                                 | 0                                                                                  | 322                                                                                 | 32                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 32.9                                                                              | 32.9                                                                              |                                                                                   |                                                                                   | 32.9                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 32.9                                                                              | 32.9                                                                              |                                                                                   |                                                                                   | 32.9                                                                              |                                                                                   |                                                                                    | 18.1                                                                                | 18.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.52                                                                              | 0.52                                                                              |                                                                                   |                                                                                   | 0.52                                                                              |                                                                                   |                                                                                    | 0.29                                                                                | 0.29                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 197                                                                               | 940                                                                               |                                                                                   |                                                                                   | 933                                                                               |                                                                                   |                                                                                    | 513                                                                                 | 439                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.48                                                                             |                                                                                   |                                                                                   | 0.41                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.12                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.18                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.24                                                                              | 0.92                                                                              |                                                                                   |                                                                                   | 0.79                                                                              |                                                                                   |                                                                                    | 0.63                                                                                | 0.07                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 8.2                                                                               | 13.8                                                                              |                                                                                   |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                    | 19.5                                                                                | 16.3                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 13.6                                                                              |                                                                                   |                                                                                   | 4.5                                                                               |                                                                                   |                                                                                    | 5.7                                                                                 | 0.3                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 8.8                                                                               | 27.4                                                                              |                                                                                   |                                                                                   | 16.7                                                                              |                                                                                   |                                                                                    | 25.2                                                                                | 16.7                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 26.4                                                                              |                                                                                   |                                                                                   | 16.7                                                                              |                                                                                   |                                                                                    | 23.0                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 22.3                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.82                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 63.0                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 72.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 31                                                                                | 843                                                                               | 36                                                                                | 67                                                                                | 733                                                                               | 60                                                                                | 26                                                                                 | 280                                                                                 | 43                                                                                  | 68                                                                                  | 217                                                                                 | 24                                                                                  |
| Future Volume (vph)               | 31                                                                                | 843                                                                               | 36                                                                                | 67                                                                                | 733                                                                               | 60                                                                                | 26                                                                                 | 280                                                                                 | 43                                                                                  | 68                                                                                  | 217                                                                                 | 24                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1790                                                                              |                                                                                   | 1711                                                                              | 1780                                                                              |                                                                                   |                                                                                    | 1764                                                                                |                                                                                     |                                                                                     | 1762                                                                                |                                                                                     |
| Flt Permitted                     | 0.17                                                                              | 1.00                                                                              |                                                                                   | 0.11                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.78                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 307                                                                               | 1790                                                                              |                                                                                   | 200                                                                               | 1780                                                                              |                                                                                   |                                                                                    | 1701                                                                                |                                                                                     |                                                                                     | 1393                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 31                                                                                | 843                                                                               | 36                                                                                | 67                                                                                | 733                                                                               | 60                                                                                | 26                                                                                 | 280                                                                                 | 43                                                                                  | 68                                                                                  | 217                                                                                 | 24                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  | 7                                                                                   | 0                                                                                   | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 31                                                                                | 877                                                                               | 0                                                                                 | 67                                                                                | 789                                                                               | 0                                                                                 | 0                                                                                  | 342                                                                                 | 0                                                                                   | 0                                                                                   | 305                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 36.1                                                                              | 36.1                                                                              |                                                                                   | 36.1                                                                              | 36.1                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 36.1                                                                              | 36.1                                                                              |                                                                                   | 36.1                                                                              | 36.1                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.53                                                                              | 0.53                                                                              |                                                                                   | 0.53                                                                              | 0.53                                                                              |                                                                                   |                                                                                    | 0.29                                                                                |                                                                                     |                                                                                     | 0.29                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 162                                                                               | 947                                                                               |                                                                                   | 105                                                                               | 942                                                                               |                                                                                   |                                                                                    | 501                                                                                 |                                                                                     |                                                                                     | 410                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.49                                                                             |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.10                                                                              |                                                                                   |                                                                                   | 0.34                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.20                                                                                |                                                                                     |                                                                                     | c0.22                                                                               |                                                                                     |
| v/c Ratio                         | 0.19                                                                              | 0.93                                                                              |                                                                                   | 0.64                                                                              | 0.84                                                                              |                                                                                   |                                                                                    | 0.68                                                                                |                                                                                     |                                                                                     | 0.74                                                                                |                                                                                     |
| Uniform Delay, d1                 | 8.4                                                                               | 14.8                                                                              |                                                                                   | 11.4                                                                              | 13.6                                                                              |                                                                                   |                                                                                    | 21.2                                                                                |                                                                                     |                                                                                     | 21.7                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 14.4                                                                              |                                                                                   | 12.0                                                                              | 6.6                                                                               |                                                                                   |                                                                                    | 7.3                                                                                 |                                                                                     |                                                                                     | 11.6                                                                                |                                                                                     |
| Delay (s)                         | 9.0                                                                               | 29.2                                                                              |                                                                                   | 23.5                                                                              | 20.1                                                                              |                                                                                   |                                                                                    | 28.6                                                                                |                                                                                     |                                                                                     | 33.3                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   | C                                                                                 | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 28.5                                                                              |                                                                                   |                                                                                   | 20.4                                                                              |                                                                                   |                                                                                    | 28.6                                                                                |                                                                                     |                                                                                     | 33.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 26.3                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 68.2                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 99.7%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

| Movement                          | EBL  | EBT   | EBR   | WBL   | WBT  | WBR  | NBL                       | NBT  | NBR   | SBL   | SBT  | SBR  |
|-----------------------------------|------|-------|-------|-------|------|------|---------------------------|------|-------|-------|------|------|
| Lane Configurations               |      | ↑↑    |       | ↑     | ↑    | ↑    |                           | ↑    | ↑     | ↑↑    | ↑    |      |
| Traffic Volume (vph)              | 0    | 1387  | 1     | 144   | 545  | 395  | 0                         | 146  | 334   | 381   | 131  | 17   |
| Future Volume (vph)               | 0    | 1387  | 1     | 144   | 545  | 395  | 0                         | 146  | 334   | 381   | 131  | 17   |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900  | 1900  | 1900 | 1900 | 1900                      | 1900 | 1900  | 1900  | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0   |       | 6.0   | 6.0  | 6.0  |                           | 6.0  | 6.0   | 6.0   | 6.0  |      |
| Lane Util. Factor                 |      | 0.95  |       | 1.00  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 0.97  | 1.00 |      |
| Frt                               |      | 1.00  |       | 1.00  | 1.00 | 0.85 |                           | 1.00 | 0.85  | 1.00  | 0.98 |      |
| Flt Protected                     |      | 1.00  |       | 0.95  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 0.95  | 1.00 |      |
| Satd. Flow (prot)                 |      | 3421  |       | 1711  | 1801 | 1531 |                           | 1801 | 1531  | 3319  | 1770 |      |
| Flt Permitted                     |      | 1.00  |       | 0.95  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 0.95  | 1.00 |      |
| Satd. Flow (perm)                 |      | 3421  |       | 1711  | 1801 | 1531 |                           | 1801 | 1531  | 3319  | 1770 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 | 1.00 | 1.00                      | 1.00 | 1.00  | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 1387  | 1     | 144   | 545  | 395  | 0                         | 146  | 334   | 381   | 131  | 17   |
| RTOR Reduction (vph)              | 0    | 0     | 0     | 0     | 0    | 0    | 0                         | 0    | 138   | 0     | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 1388  | 0     | 144   | 545  | 395  | 0                         | 146  | 196   | 381   | 148  | 0    |
| Turn Type                         |      | NA    |       | Prot  | NA   | Prot |                           | NA   | Perm  | Prot  | NA   |      |
| Protected Phases                  |      | 4     |       | 3     | 8    | 8    |                           | 2    |       | 1     | 6    |      |
| Permitted Phases                  |      |       |       |       |      |      |                           |      | 2     |       |      |      |
| Actuated Green, G (s)             |      | 39.1  |       | 8.0   | 53.1 | 53.1 |                           | 15.2 | 15.2  | 11.1  | 32.3 |      |
| Effective Green, g (s)            |      | 39.1  |       | 8.0   | 53.1 | 53.1 |                           | 15.2 | 15.2  | 11.1  | 32.3 |      |
| Actuated g/C Ratio                |      | 0.40  |       | 0.08  | 0.55 | 0.55 |                           | 0.16 | 0.16  | 0.11  | 0.33 |      |
| Clearance Time (s)                |      | 6.0   |       | 6.0   | 6.0  | 6.0  |                           | 6.0  | 6.0   | 6.0   | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0   |       | 3.0   | 3.0  | 3.0  |                           | 3.0  | 3.0   | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)                |      | 1373  |       | 140   | 981  | 834  |                           | 281  | 238   | 378   | 586  |      |
| v/s Ratio Prot                    |      | c0.41 |       | c0.08 | 0.30 | 0.26 |                           | 0.08 |       | c0.11 | 0.08 |      |
| v/s Ratio Perm                    |      |       |       |       |      |      |                           |      | c0.13 |       |      |      |
| v/c Ratio                         |      | 1.01  |       | 1.03  | 0.56 | 0.47 |                           | 0.52 | 0.82  | 1.01  | 0.25 |      |
| Uniform Delay, d1                 |      | 29.2  |       | 44.7  | 14.5 | 13.6 |                           | 37.7 | 39.8  | 43.2  | 23.7 |      |
| Progression Factor                |      | 1.00  |       | 1.00  | 1.00 | 1.00 |                           | 1.00 | 1.00  | 1.00  | 1.00 |      |
| Incremental Delay, d2             |      | 27.0  |       | 83.8  | 2.3  | 1.9  |                           | 1.6  | 19.9  | 48.3  | 0.2  |      |
| Delay (s)                         |      | 56.2  |       | 128.5 | 16.7 | 15.5 |                           | 39.4 | 59.7  | 91.4  | 24.0 |      |
| Level of Service                  |      | E     |       | F     | B    | B    |                           | D    | E     | F     | C    |      |
| Approach Delay (s)                |      | 56.2  |       |       | 31.1 |      |                           | 53.5 |       |       | 72.6 |      |
| Approach LOS                      |      | E     |       |       | C    |      |                           | D    |       |       | E    |      |
| <b>Intersection Summary</b>       |      |       |       |       |      |      |                           |      |       |       |      |      |
| HCM 2000 Control Delay            |      |       | 50.5  |       |      |      | HCM 2000 Level of Service |      |       | D     |      |      |
| HCM 2000 Volume to Capacity ratio |      |       | 0.97  |       |      |      |                           |      |       |       |      |      |
| Actuated Cycle Length (s)         |      |       | 97.4  |       |      |      | Sum of lost time (s)      |      |       | 24.0  |      |      |
| Intersection Capacity Utilization |      |       | 84.9% |       |      |      | ICU Level of Service      |      |       | E     |      |      |
| Analysis Period (min)             |      |       | 15    |       |      |      |                           |      |       |       |      |      |
| c Critical Lane Group             |      |       |       |       |      |      |                           |      |       |       |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 3: Pine St &amp; Bank St

12/12/2016

|                                   |  |      |                                                                                   |      |                           |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|------|---------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR  | NBT                                                                               | NBR  | SBL                       | SBT                                                                               |
| Lane Configurations               |  |      |  |      |                           |  |
| Traffic Volume (vph)              | 69                                                                                | 0    | 5                                                                                 | 99   | 0                         | 14                                                                                |
| Future Volume (vph)               | 69                                                                                | 0    | 5                                                                                 | 99   | 0                         | 14                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900 | 1900                                                                              | 1900 | 1900                      | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |      | 6.0                                                                               |      |                           | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Frt                               | 1.00                                                                              |      | 0.87                                                                              |      |                           | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              |      | 1569                                                                              |      |                           | 1801                                                                              |
| Flt Permitted                     | 0.95                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              |      | 1569                                                                              |      |                           | 1801                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00 | 1.00                                                                              | 1.00 | 1.00                      | 1.00                                                                              |
| Adj. Flow (vph)                   | 69                                                                                | 0    | 5                                                                                 | 99   | 0                         | 14                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0    | 32                                                                                | 0    | 0                         | 0                                                                                 |
| Lane Group Flow (vph)             | 69                                                                                | 0    | 72                                                                                | 0    | 0                         | 14                                                                                |
| Turn Type                         | Prot                                                                              |      | NA                                                                                |      |                           | NA                                                                                |
| Protected Phases                  | 8                                                                                 |      | 2                                                                                 |      |                           | 6                                                                                 |
| Permitted Phases                  |                                                                                   |      |                                                                                   |      | 6                         |                                                                                   |
| Actuated Green, G (s)             | 3.3                                                                               |      | 31.8                                                                              |      |                           | 31.8                                                                              |
| Effective Green, g (s)            | 3.3                                                                               |      | 31.8                                                                              |      |                           | 31.8                                                                              |
| Actuated g/C Ratio                | 0.07                                                                              |      | 0.68                                                                              |      |                           | 0.68                                                                              |
| Clearance Time (s)                | 6.0                                                                               |      | 6.0                                                                               |      |                           | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               |      | 3.0                                                                               |      |                           | 3.0                                                                               |
| Lane Grp Cap (vph)                | 119                                                                               |      | 1059                                                                              |      |                           | 1215                                                                              |
| v/s Ratio Prot                    | c0.04                                                                             |      | c0.05                                                                             |      |                           | 0.01                                                                              |
| v/s Ratio Perm                    |                                                                                   |      |                                                                                   |      |                           |                                                                                   |
| v/c Ratio                         | 0.58                                                                              |      | 0.07                                                                              |      |                           | 0.01                                                                              |
| Uniform Delay, d1                 | 21.2                                                                              |      | 2.6                                                                               |      |                           | 2.5                                                                               |
| Progression Factor                | 1.00                                                                              |      | 1.00                                                                              |      |                           | 1.00                                                                              |
| Incremental Delay, d2             | 6.7                                                                               |      | 0.1                                                                               |      |                           | 0.0                                                                               |
| Delay (s)                         | 27.9                                                                              |      | 2.7                                                                               |      |                           | 2.5                                                                               |
| Level of Service                  | C                                                                                 |      | A                                                                                 |      |                           | A                                                                                 |
| Approach Delay (s)                | 27.9                                                                              |      | 2.7                                                                               |      |                           | 2.5                                                                               |
| Approach LOS                      | C                                                                                 |      | A                                                                                 |      |                           | A                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |      |                                                                                   |      |                           |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |      | 12.0                                                                              |      | HCM 2000 Level of Service | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |      | 0.12                                                                              |      |                           |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |      | 47.1                                                                              |      | Sum of lost time (s)      | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |      | 20.6%                                                                             |      | ICU Level of Service      | A                                                                                 |
| Analysis Period (min)             |                                                                                   |      | 15                                                                                |      |                           |                                                                                   |
| c Critical Lane Group             |                                                                                   |      |                                                                                   |      |                           |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 4: Pine St &amp; Cherry St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 26                                                                                | 147                                                                               | 0                                                                                 | 0                                                                                 | 108                                                                               | 71                                                                                | 0                                                                                  | 5                                                                                   | 0                                                                                   | 85                                                                                  | 14                                                                                  | 76                                                                                  |
| Future Volume (vph)               | 26                                                                                | 147                                                                               | 0                                                                                 | 0                                                                                 | 108                                                                               | 71                                                                                | 0                                                                                  | 5                                                                                   | 0                                                                                   | 85                                                                                  | 14                                                                                  | 76                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.95                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.94                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1787                                                                              |                                                                                   |                                                                                   | 1704                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1655                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.91                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.87                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1638                                                                              |                                                                                   |                                                                                   | 1704                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1472                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 26                                                                                | 147                                                                               | 0                                                                                 | 0                                                                                 | 108                                                                               | 71                                                                                | 0                                                                                  | 5                                                                                   | 0                                                                                   | 85                                                                                  | 14                                                                                  | 76                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 58                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 35                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 173                                                                               | 0                                                                                 | 0                                                                                 | 121                                                                               | 0                                                                                 | 0                                                                                  | 5                                                                                   | 0                                                                                   | 0                                                                                   | 140                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   |                                                                                    | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 8.2                                                                               |                                                                                   |                                                                                   | 8.2                                                                               |                                                                                   |                                                                                    | 23.1                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 8.2                                                                               |                                                                                   |                                                                                   | 8.2                                                                               |                                                                                   |                                                                                    | 23.1                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.19                                                                              |                                                                                   |                                                                                   | 0.19                                                                              |                                                                                   |                                                                                    | 0.53                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 310                                                                               |                                                                                   |                                                                                   | 322                                                                               |                                                                                   |                                                                                    | 960                                                                                 |                                                                                     |                                                                                     | 785                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.07                                                                              |                                                                                   |                                                                                    | 0.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.11                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.09                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.56                                                                              |                                                                                   |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                    | 0.01                                                                                |                                                                                     |                                                                                     | 0.18                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 15.9                                                                              |                                                                                   |                                                                                   | 15.3                                                                              |                                                                                   |                                                                                    | 4.7                                                                                 |                                                                                     |                                                                                     | 5.2                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 18.1                                                                              |                                                                                   |                                                                                   | 16.1                                                                              |                                                                                   |                                                                                    | 4.7                                                                                 |                                                                                     |                                                                                     | 5.7                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 18.1                                                                              |                                                                                   |                                                                                   | 16.1                                                                              |                                                                                   |                                                                                    | 4.7                                                                                 |                                                                                     |                                                                                     | 5.7                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 43.3                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                   |  |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                       | SBT                                                                               |
| Lane Configurations               |  |  |  |  |                           |  |
| Traffic Volume (vph)              | 166                                                                               | 83                                                                                | 327                                                                               | 188                                                                               | 338                       | 1393                                                                              |
| Future Volume (vph)               | 166                                                                               | 83                                                                                | 327                                                                               | 188                                                                               | 338                       | 1393                                                                              |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                      | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                           | 0.95                                                                              |
| Frt                               | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                           | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.99                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 3388                                                                              |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 0.79                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                           | 2701                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                      | 1.00                                                                              |
| Adj. Flow (vph)                   | 166                                                                               | 83                                                                                | 327                                                                               | 188                                                                               | 338                       | 1393                                                                              |
| RTOR Reduction (vph)              | 0                                                                                 | 70                                                                                | 0                                                                                 | 54                                                                                | 0                         | 0                                                                                 |
| Lane Group Flow (vph)             | 166                                                                               | 13                                                                                | 327                                                                               | 134                                                                               | 0                         | 1731                                                                              |
| Turn Type                         | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                      | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                           | 6                                                                                 |
| Permitted Phases                  |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                         |                                                                                   |
| Actuated Green, G (s)             | 13.5                                                                              | 13.5                                                                              | 63.0                                                                              | 63.0                                                                              |                           | 63.0                                                                              |
| Effective Green, g (s)            | 13.5                                                                              | 13.5                                                                              | 63.0                                                                              | 63.0                                                                              |                           | 63.0                                                                              |
| Actuated g/C Ratio                | 0.15                                                                              | 0.15                                                                              | 0.71                                                                              | 0.71                                                                              |                           | 0.71                                                                              |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                           | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                           | 3.0                                                                               |
| Lane Grp Cap (vph)                | 261                                                                               | 233                                                                               | 1282                                                                              | 1917                                                                              |                           | 1922                                                                              |
| v/s Ratio Prot                    | c0.10                                                                             |                                                                                   | 0.18                                                                              |                                                                                   |                           |                                                                                   |
| v/s Ratio Perm                    |                                                                                   | 0.01                                                                              |                                                                                   | 0.05                                                                              |                           | c0.64                                                                             |
| v/c Ratio                         | 0.64                                                                              | 0.05                                                                              | 0.26                                                                              | 0.07                                                                              |                           | 0.90                                                                              |
| Uniform Delay, d1                 | 35.2                                                                              | 32.0                                                                              | 4.5                                                                               | 3.9                                                                               |                           | 10.2                                                                              |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                           | 1.00                                                                              |
| Incremental Delay, d2             | 5.0                                                                               | 0.1                                                                               | 0.5                                                                               | 0.1                                                                               |                           | 7.3                                                                               |
| Delay (s)                         | 40.2                                                                              | 32.1                                                                              | 5.0                                                                               | 3.9                                                                               |                           | 17.5                                                                              |
| Level of Service                  | D                                                                                 | C                                                                                 | A                                                                                 | A                                                                                 |                           | B                                                                                 |
| Approach Delay (s)                | 37.5                                                                              |                                                                                   | 4.6                                                                               |                                                                                   |                           | 17.5                                                                              |
| Approach LOS                      | D                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                           | B                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 16.9                                                                              |                                                                                   | HCM 2000 Level of Service | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |                           |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.5                                                                              |                                                                                   | Sum of lost time (s)      | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 89.7%                                                                             |                                                                                   | ICU Level of Service      | E                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                           |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                           |                                                                                   |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (vph)              | 383                                                                               | 63                                                                                | 121                                                                               | 331                                                                               | 36                                                                                | 44                                                                                |
| Future Volume (vph)               | 383                                                                               | 63                                                                                | 121                                                                               | 331                                                                               | 36                                                                                | 44                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Frt                               | 0.98                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.93                                                                              |                                                                                   |
| Flt Protected                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (prot)                 | 1766                                                                              |                                                                                   |                                                                                   | 1777                                                                              | 1630                                                                              |                                                                                   |
| Flt Permitted                     | 1.00                                                                              |                                                                                   |                                                                                   | 0.65                                                                              | 0.98                                                                              |                                                                                   |
| Satd. Flow (perm)                 | 1766                                                                              |                                                                                   |                                                                                   | 1171                                                                              | 1630                                                                              |                                                                                   |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 383                                                                               | 63                                                                                | 121                                                                               | 331                                                                               | 36                                                                                | 44                                                                                |
| RTOR Reduction (vph)              | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 29                                                                                | 0                                                                                 |
| Lane Group Flow (vph)             | 435                                                                               | 0                                                                                 | 0                                                                                 | 452                                                                               | 51                                                                                | 0                                                                                 |
| Turn Type                         | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Prot                                                                              |                                                                                   |
| Protected Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2                                                                                 |                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Actuated Green, G (s)             | 22.5                                                                              |                                                                                   |                                                                                   | 22.5                                                                              | 18.3                                                                              |                                                                                   |
| Effective Green, g (s)            | 22.5                                                                              |                                                                                   |                                                                                   | 22.5                                                                              | 18.3                                                                              |                                                                                   |
| Actuated g/C Ratio                | 0.43                                                                              |                                                                                   |                                                                                   | 0.43                                                                              | 0.35                                                                              |                                                                                   |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |
| Lane Grp Cap (vph)                | 752                                                                               |                                                                                   |                                                                                   | 499                                                                               | 564                                                                               |                                                                                   |
| v/s Ratio Prot                    | 0.25                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.03                                                                              |                                                                                   |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.58                                                                              |                                                                                   |                                                                                   | 0.91                                                                              | 0.09                                                                              |                                                                                   |
| Uniform Delay, d1                 | 11.5                                                                              |                                                                                   |                                                                                   | 14.2                                                                              | 11.6                                                                              |                                                                                   |
| Progression Factor                | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |
| Incremental Delay, d2             | 1.1                                                                               |                                                                                   |                                                                                   | 19.8                                                                              | 0.3                                                                               |                                                                                   |
| Delay (s)                         | 12.6                                                                              |                                                                                   |                                                                                   | 34.0                                                                              | 12.0                                                                              |                                                                                   |
| Level of Service                  | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| Approach Delay (s)                | 12.6                                                                              |                                                                                   |                                                                                   | 34.0                                                                              | 12.0                                                                              |                                                                                   |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 22.4                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | C                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 52.8                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 67.8%                                                                             |                                                                                   | ICU Level of Service                                                              | C                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

| Movement                          | EBL  | EBT  | EBR   | WBL   | WBT   | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|-------|-------|-------|---------------------------|-------|------|------|------|------|------|
| Lane Configurations               |      | ↑    | ↑     | ↑     | ↑     |                           | ↑     |      | ↑    | ↑    | ↑↓   | ↑    |
| Traffic Volume (vph)              | 0    | 208  | 103   | 207   | 440   | 0                         | 130   | 0    | 111  | 61   | 386  | 86   |
| Future Volume (vph)               | 0    | 208  | 103   | 207   | 440   | 0                         | 130   | 0    | 111  | 61   | 386  | 86   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900  | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0  | 6.0   | 6.0   | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Lane Util. Factor                 |      | 1.00 | 1.00  | 1.00  | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 0.95 |      |
| Frt                               |      | 1.00 | 0.85  | 1.00  | 1.00  |                           | 1.00  |      | 0.85 | 1.00 | 0.97 |      |
| Flt Protected                     |      | 1.00 | 1.00  | 0.95  | 1.00  |                           | 0.95  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (prot)                 |      | 1801 | 1531  | 1711  | 1801  |                           | 1711  |      | 1531 | 1711 | 3328 |      |
| Flt Permitted                     |      | 1.00 | 1.00  | 0.95  | 1.00  |                           | 0.48  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (perm)                 |      | 1801 | 1531  | 1711  | 1801  |                           | 867   |      | 1531 | 1711 | 3328 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00  | 1.00  | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 208  | 103   | 207   | 440   | 0                         | 130   | 0    | 111  | 61   | 386  | 86   |
| RTOR Reduction (vph)              | 0    | 0    | 0     | 0     | 0     | 0                         | 0     | 0    | 74   | 0    | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 208  | 103   | 207   | 440   | 0                         | 130   | 0    | 37   | 61   | 472  | 0    |
| Turn Type                         |      | NA   | Perm  | Prot  | NA    |                           | Perm  |      | Perm | Perm | NA   |      |
| Protected Phases                  |      | 4    |       | 3     | 8     |                           |       |      |      |      | 6    |      |
| Permitted Phases                  |      |      | 4     |       |       |                           | 2     |      | 2    | 6    |      |      |
| Actuated Green, G (s)             |      | 11.5 | 11.5  | 6.0   | 23.5  |                           | 18.1  |      | 18.1 | 18.1 | 18.1 |      |
| Effective Green, g (s)            |      | 11.5 | 11.5  | 6.0   | 23.5  |                           | 18.1  |      | 18.1 | 18.1 | 18.1 |      |
| Actuated g/C Ratio                |      | 0.21 | 0.21  | 0.11  | 0.44  |                           | 0.34  |      | 0.34 | 0.34 | 0.34 |      |
| Clearance Time (s)                |      | 6.0  | 6.0   | 6.0   | 6.0   |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0  | 3.0   | 3.0   | 3.0   |                           | 3.0   |      | 3.0  | 3.0  | 3.0  |      |
| Lane Grp Cap (vph)                |      | 386  | 328   | 191   | 789   |                           | 292   |      | 516  | 577  | 1123 |      |
| v/s Ratio Prot                    |      | 0.12 |       | c0.12 | c0.24 |                           |       |      |      |      | 0.14 |      |
| v/s Ratio Perm                    |      |      | 0.07  |       |       |                           | c0.15 |      | 0.02 | 0.04 |      |      |
| v/c Ratio                         |      | 0.54 | 0.31  | 1.08  | 0.56  |                           | 0.45  |      | 0.07 | 0.11 | 0.42 |      |
| Uniform Delay, d1                 |      | 18.7 | 17.7  | 23.8  | 11.2  |                           | 13.8  |      | 12.1 | 12.2 | 13.7 |      |
| Progression Factor                |      | 1.00 | 1.00  | 1.00  | 1.00  |                           | 1.00  |      | 1.00 | 1.00 | 1.00 |      |
| Incremental Delay, d2             |      | 1.5  | 0.6   | 89.2  | 0.9   |                           | 4.9   |      | 0.3  | 0.4  | 1.2  |      |
| Delay (s)                         |      | 20.1 | 18.3  | 113.0 | 12.0  |                           | 18.7  |      | 12.3 | 12.6 | 14.9 |      |
| Level of Service                  |      | C    | B     | F     | B     |                           | B     |      | B    | B    | B    |      |
| Approach Delay (s)                |      | 19.5 |       |       | 44.3  |                           |       | 15.8 |      |      | 14.6 |      |
| Approach LOS                      |      | B    |       |       | D     |                           |       | B    |      |      | B    |      |
| <b>Intersection Summary</b>       |      |      |       |       |       |                           |       |      |      |      |      |      |
| HCM 2000 Control Delay            |      |      | 26.8  |       |       | HCM 2000 Level of Service |       |      | C    |      |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.64  |       |       |                           |       |      |      |      |      |      |
| Actuated Cycle Length (s)         |      |      | 53.6  |       |       | Sum of lost time (s)      |       |      | 18.0 |      |      |      |
| Intersection Capacity Utilization |      |      | 61.4% |       |       | ICU Level of Service      |       |      | B    |      |      |      |
| Analysis Period (min)             |      |      | 15    |       |       |                           |       |      |      |      |      |      |
| c Critical Lane Group             |      |      |       |       |       |                           |       |      |      |      |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 56                                                                                | 354                                                                               | 0                                                                                 | 0                                                                                 | 544                                                                               | 69                                                                                | 31                                                                                  | 108                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 56                                                                                | 354                                                                               | 0                                                                                 | 0                                                                                 | 544                                                                               | 69                                                                                | 31                                                                                  | 108                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                                | 0.95                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1773                                                                              |                                                                                   | 1711                                                                                | 1713                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.25                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 449                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1773                                                                              |                                                                                   | 1711                                                                                | 1713                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 56                                                                                | 354                                                                               | 0                                                                                 | 0                                                                                 | 544                                                                               | 69                                                                                | 31                                                                                  | 108                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                   | 27                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 56                                                                                | 354                                                                               | 0                                                                                 | 0                                                                                 | 604                                                                               | 0                                                                                 | 31                                                                                  | 133                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 22.8                                                                              | 22.8                                                                              |                                                                                   |                                                                                   | 22.8                                                                              |                                                                                   | 18.3                                                                                | 18.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 22.8                                                                              | 22.8                                                                              |                                                                                   |                                                                                   | 22.8                                                                              |                                                                                   | 18.3                                                                                | 18.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.43                                                                              | 0.43                                                                              |                                                                                   |                                                                                   | 0.43                                                                              |                                                                                   | 0.34                                                                                | 0.34                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 192                                                                               | 773                                                                               |                                                                                   |                                                                                   | 761                                                                               |                                                                                   | 589                                                                                 | 590                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | c0.34                                                                             |                                                                                   |                                                                                     | c0.08                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.12                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.29                                                                              | 0.46                                                                              |                                                                                   |                                                                                   | 0.79                                                                              |                                                                                   | 0.05                                                                                | 0.23                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 9.9                                                                               | 10.8                                                                              |                                                                                   |                                                                                   | 13.1                                                                              |                                                                                   | 11.6                                                                                | 12.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.8                                                                               | 0.4                                                                               |                                                                                   |                                                                                   | 5.7                                                                               |                                                                                   | 0.2                                                                                 | 0.9                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 10.7                                                                              | 11.2                                                                              |                                                                                   |                                                                                   | 18.8                                                                              |                                                                                   | 11.8                                                                                | 13.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.1                                                                              |                                                                                   |                                                                                   | 18.8                                                                              |                                                                                   |                                                                                     | 13.0                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.3                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 53.1                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 60.8%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 20                                                                                | 362                                                                               | 48                                                                                | 51                                                                                | 533                                                                               | 18                                                                                | 35                                                                                 | 110                                                                                 | 52                                                                                  | 26                                                                                  | 247                                                                                 | 35                                                                                  |
| Future Volume (vph)               | 20                                                                                | 362                                                                               | 48                                                                                | 51                                                                                | 533                                                                               | 18                                                                                | 35                                                                                 | 110                                                                                 | 52                                                                                  | 26                                                                                  | 247                                                                                 | 35                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1769                                                                              |                                                                                   | 1711                                                                              | 1792                                                                              |                                                                                   |                                                                                    | 1721                                                                                |                                                                                     |                                                                                     | 1766                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.96                                                                              |                                                                                   | 0.48                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.90                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1706                                                                              |                                                                                   | 868                                                                               | 1792                                                                              |                                                                                   |                                                                                    | 1556                                                                                |                                                                                     |                                                                                     | 1705                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 20                                                                                | 362                                                                               | 48                                                                                | 51                                                                                | 533                                                                               | 18                                                                                | 35                                                                                 | 110                                                                                 | 52                                                                                  | 26                                                                                  | 247                                                                                 | 35                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 26                                                                                  | 0                                                                                   | 0                                                                                   | 9                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 421                                                                               | 0                                                                                 | 51                                                                                | 549                                                                               | 0                                                                                 | 0                                                                                  | 171                                                                                 | 0                                                                                   | 0                                                                                   | 299                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              |                                                                                   |                                                                                    | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 20.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              |                                                                                   |                                                                                    | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.40                                                                              |                                                                                   | 0.40                                                                              | 0.40                                                                              |                                                                                   |                                                                                    | 0.36                                                                                |                                                                                     |                                                                                     | 0.36                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 682                                                                               |                                                                                   | 347                                                                               | 716                                                                               |                                                                                   |                                                                                    | 560                                                                                 |                                                                                     |                                                                                     | 613                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | c0.31                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.25                                                                              |                                                                                   | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.11                                                                                |                                                                                     |                                                                                     | c0.18                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.62                                                                              |                                                                                   | 0.15                                                                              | 0.77                                                                              |                                                                                   |                                                                                    | 0.31                                                                                |                                                                                     |                                                                                     | 0.49                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 12.0                                                                              |                                                                                   | 9.6                                                                               | 13.0                                                                              |                                                                                   |                                                                                    | 11.5                                                                                |                                                                                     |                                                                                     | 12.4                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 4.2                                                                               |                                                                                   | 0.9                                                                               | 7.7                                                                               |                                                                                   |                                                                                    | 1.4                                                                                 |                                                                                     |                                                                                     | 2.8                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 16.1                                                                              |                                                                                   | 10.5                                                                              | 20.7                                                                              |                                                                                   |                                                                                    | 12.9                                                                                |                                                                                     |                                                                                     | 15.2                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 16.1                                                                              |                                                                                   |                                                                                   | 19.8                                                                              |                                                                                   |                                                                                    | 12.9                                                                                |                                                                                     |                                                                                     | 15.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 17.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.63                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 50.0                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 67.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |  |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 414                                                                               | 77                                                                                | 203                                                                               | 569                                                                               | 46                                                                                | 78                                                                                  | 76                                                                                  | 125                                                                                 | 39                                                                                  | 231                                                                                 | 27                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 414                                                                               | 77                                                                                | 203                                                                               | 569                                                                               | 46                                                                                | 78                                                                                  | 76                                                                                  | 125                                                                                 | 39                                                                                  | 231                                                                                 | 27                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1763                                                                              |                                                                                   | 1711                                                                              | 1780                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1767                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.22                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1763                                                                              |                                                                                   | 396                                                                               | 1780                                                                              |                                                                                   | 1711                                                                                | 1801                                                                                | 1531                                                                                |                                                                                     | 1767                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 414                                                                               | 77                                                                                | 203                                                                               | 569                                                                               | 46                                                                                | 78                                                                                  | 76                                                                                  | 125                                                                                 | 39                                                                                  | 231                                                                                 | 27                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 110                                                                                 | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 484                                                                               | 0                                                                                 | 203                                                                               | 615                                                                               | 0                                                                                 | 78                                                                                  | 76                                                                                  | 15                                                                                  | 0                                                                                   | 293                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     | Split                                                                               | NA                                                                                  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   | 6                                                                                   |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 20.1                                                                              |                                                                                   | 31.1                                                                              | 31.1                                                                              |                                                                                   | 8.9                                                                                 | 8.9                                                                                 | 8.9                                                                                 |                                                                                     | 16.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 20.1                                                                              |                                                                                   | 31.1                                                                              | 31.1                                                                              |                                                                                   | 8.9                                                                                 | 8.9                                                                                 | 8.9                                                                                 |                                                                                     | 16.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.27                                                                              |                                                                                   | 0.42                                                                              | 0.42                                                                              |                                                                                   | 0.12                                                                                | 0.12                                                                                | 0.12                                                                                |                                                                                     | 0.22                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 478                                                                               |                                                                                   | 254                                                                               | 747                                                                               |                                                                                   | 205                                                                                 | 216                                                                                 | 183                                                                                 |                                                                                     | 383                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.27                                                                             |                                                                                   | 0.05                                                                              | c0.35                                                                             |                                                                                   | c0.05                                                                               | 0.04                                                                                |                                                                                     |                                                                                     | c0.17                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 1.01                                                                              |                                                                                   | 0.80                                                                              | 0.82                                                                              |                                                                                   | 0.38                                                                                | 0.35                                                                                | 0.08                                                                                |                                                                                     | 0.77                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 27.0                                                                              |                                                                                   | 27.1                                                                              | 19.1                                                                              |                                                                                   | 30.1                                                                                | 30.0                                                                                | 29.0                                                                                |                                                                                     | 27.2                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 44.2                                                                              |                                                                                   | 16.0                                                                              | 10.0                                                                              |                                                                                   | 1.2                                                                                 | 1.0                                                                                 | 0.2                                                                                 |                                                                                     | 8.8                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 71.2                                                                              |                                                                                   | 43.0                                                                              | 29.0                                                                              |                                                                                   | 31.2                                                                                | 30.9                                                                                | 29.2                                                                                |                                                                                     | 36.0                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | E                                                                                 |                                                                                   | D                                                                                 | C                                                                                 |                                                                                   | C                                                                                   | C                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 71.2                                                                              |                                                                                   |                                                                                   | 32.5                                                                              |                                                                                   |                                                                                     | 30.2                                                                                |                                                                                     |                                                                                     | 36.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 42.8                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.84                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 74.1                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 96.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 6                                                                                 | 459                                                                               | 229                                                                               | 78                                                                                | 451                                                                               | 122                                                                               | 215                                                                                | 206                                                                                 | 73                                                                                  | 44                                                                                  | 149                                                                                 | 15                                                                                  |
| Future Volume (vph)               | 6                                                                                 | 459                                                                               | 229                                                                               | 78                                                                                | 451                                                                               | 122                                                                               | 215                                                                                | 206                                                                                 | 73                                                                                  | 44                                                                                  | 149                                                                                 | 15                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.96                                                                              |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1720                                                                              |                                                                                   |                                                                                   | 1745                                                                              |                                                                                   |                                                                                    | 1756                                                                                | 1531                                                                                |                                                                                     | 1764                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.84                                                                              |                                                                                   |                                                                                    | 0.75                                                                                | 1.00                                                                                |                                                                                     | 0.78                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1711                                                                              |                                                                                   |                                                                                   | 1469                                                                              |                                                                                   |                                                                                    | 1356                                                                                | 1531                                                                                |                                                                                     | 1385                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 6                                                                                 | 459                                                                               | 229                                                                               | 78                                                                                | 451                                                                               | 122                                                                               | 215                                                                                | 206                                                                                 | 73                                                                                  | 44                                                                                  | 149                                                                                 | 15                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 28                                                                                | 0                                                                                 | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 48                                                                                  | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 666                                                                               | 0                                                                                 | 0                                                                                 | 638                                                                               | 0                                                                                 | 0                                                                                  | 421                                                                                 | 25                                                                                  | 0                                                                                   | 203                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 29.2                                                                              |                                                                                   |                                                                                   | 29.2                                                                              |                                                                                   |                                                                                    | 22.1                                                                                | 22.1                                                                                |                                                                                     | 22.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 29.2                                                                              |                                                                                   |                                                                                   | 29.2                                                                              |                                                                                   |                                                                                    | 22.1                                                                                | 22.1                                                                                |                                                                                     | 22.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.35                                                                                |                                                                                     | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 789                                                                               |                                                                                   |                                                                                   | 677                                                                               |                                                                                   |                                                                                    | 473                                                                                 | 534                                                                                 |                                                                                     | 483                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   | c0.43                                                                             |                                                                                   |                                                                                    | c0.31                                                                               | 0.02                                                                                |                                                                                     | 0.15                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.84                                                                              |                                                                                   |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                    | 0.89                                                                                | 0.05                                                                                |                                                                                     | 0.42                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 15.0                                                                              |                                                                                   |                                                                                   | 16.2                                                                              |                                                                                   |                                                                                    | 19.5                                                                                | 13.6                                                                                |                                                                                     | 15.7                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 8.2                                                                               |                                                                                   |                                                                                   | 21.5                                                                              |                                                                                   |                                                                                    | 21.5                                                                                | 0.2                                                                                 |                                                                                     | 2.7                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 23.3                                                                              |                                                                                   |                                                                                   | 37.8                                                                              |                                                                                   |                                                                                    | 40.9                                                                                | 13.8                                                                                |                                                                                     | 18.4                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | D                                                                                   | B                                                                                   |                                                                                     | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 23.3                                                                              |                                                                                   |                                                                                   | 37.8                                                                              |                                                                                   |                                                                                    | 36.9                                                                                |                                                                                     |                                                                                     | 18.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 30.7                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.92                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 63.3                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 127.8%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |  |  |  |
| Traffic Volume (vph)              | 4                                                                                 | 376                                                                               | 77                                                                                | 65                                                                                | 476                                                                               | 104                                                                               | 113                                                                                | 162                                                                                 | 52                                                                                  | 42                                                                                  | 43                                                                                  | 18                                                                                  |
| Future Volume (vph)               | 4                                                                                 | 376                                                                               | 77                                                                                | 65                                                                                | 476                                                                               | 104                                                                               | 113                                                                                | 162                                                                                 | 52                                                                                  | 42                                                                                  | 43                                                                                  | 18                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.96                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1800                                                                              | 1531                                                                              | 1711                                                                              | 1752                                                                              |                                                                                   |                                                                                    | 1764                                                                                | 1531                                                                                | 1711                                                                                | 1721                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.48                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.84                                                                                | 1.00                                                                                | 0.59                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1789                                                                              | 1531                                                                              | 862                                                                               | 1752                                                                              |                                                                                   |                                                                                    | 1510                                                                                | 1531                                                                                | 1055                                                                                | 1721                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 4                                                                                 | 376                                                                               | 77                                                                                | 65                                                                                | 476                                                                               | 104                                                                               | 113                                                                                | 162                                                                                 | 52                                                                                  | 42                                                                                  | 43                                                                                  | 18                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 45                                                                                | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 33                                                                                  | 0                                                                                   | 11                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 380                                                                               | 32                                                                                | 65                                                                                | 565                                                                               | 0                                                                                 | 0                                                                                  | 275                                                                                 | 19                                                                                  | 42                                                                                  | 50                                                                                  | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 22.1                                                                              | 22.1                                                                              | 22.1                                                                              | 22.1                                                                              |                                                                                   |                                                                                    | 19.3                                                                                | 19.3                                                                                | 19.3                                                                                | 19.3                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 22.1                                                                              | 22.1                                                                              | 22.1                                                                              | 22.1                                                                              |                                                                                   |                                                                                    | 19.3                                                                                | 19.3                                                                                | 19.3                                                                                | 19.3                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.41                                                                              | 0.41                                                                              | 0.41                                                                              | 0.41                                                                              |                                                                                   |                                                                                    | 0.36                                                                                | 0.36                                                                                | 0.36                                                                                | 0.36                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 740                                                                               | 633                                                                               | 356                                                                               | 725                                                                               |                                                                                   |                                                                                    | 545                                                                                 | 553                                                                                 | 381                                                                                 | 622                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | c0.32                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.03                                                                                |
| v/s Ratio Perm                    |                                                                                   | 0.21                                                                              | 0.02                                                                              | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.18                                                                               | 0.01                                                                                | 0.04                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.51                                                                              | 0.05                                                                              | 0.18                                                                              | 0.78                                                                              |                                                                                   |                                                                                    | 0.50                                                                                | 0.03                                                                                | 0.11                                                                                | 0.08                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 11.6                                                                              | 9.4                                                                               | 9.9                                                                               | 13.5                                                                              |                                                                                   |                                                                                    | 13.3                                                                                | 11.0                                                                                | 11.3                                                                                | 11.2                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 0.6                                                                               | 0.0                                                                               | 0.2                                                                               | 5.3                                                                               |                                                                                   |                                                                                    | 3.3                                                                                 | 0.1                                                                                 | 0.6                                                                                 | 0.3                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 12.3                                                                              | 9.4                                                                               | 10.2                                                                              | 18.9                                                                              |                                                                                   |                                                                                    | 16.6                                                                                | 11.1                                                                                | 11.9                                                                                | 11.5                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 | A                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.8                                                                              |                                                                                   |                                                                                   | 18.0                                                                              |                                                                                   |                                                                                    | 15.8                                                                                |                                                                                     |                                                                                     | 11.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 15.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.65                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 53.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 88.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 42                                                                                | 390                                                                               | 19                                                                                | 112                                                                               | 531                                                                               | 140                                                                               | 11                                                                                 | 59                                                                                  | 12                                                                                  | 93                                                                                  | 350                                                                                 | 108                                                                                 |
| Future Volume (vph)               | 42                                                                                | 390                                                                               | 19                                                                                | 112                                                                               | 531                                                                               | 140                                                                               | 11                                                                                 | 59                                                                                  | 12                                                                                  | 93                                                                                  | 350                                                                                 | 108                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.99                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1625                                                                              | 1698                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1753                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.29                                                                              | 0.99                                                                              |                                                                                   | 0.41                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.94                                                                                |                                                                                     | 0.70                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 501                                                                               | 1688                                                                              |                                                                                   | 732                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1651                                                                                |                                                                                     | 1267                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 42                                                                                | 390                                                                               | 19                                                                                | 112                                                                               | 531                                                                               | 140                                                                               | 11                                                                                 | 59                                                                                  | 12                                                                                  | 93                                                                                  | 350                                                                                 | 108                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 88                                                                                | 0                                                                                  | 7                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 67                                                                                  |
| Lane Group Flow (vph)             | 38                                                                                | 409                                                                               | 0                                                                                 | 112                                                                               | 531                                                                               | 52                                                                                | 0                                                                                  | 75                                                                                  | 0                                                                                   | 93                                                                                  | 350                                                                                 | 41                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 17.7                                                                              | 17.7                                                                              |                                                                                   | 17.7                                                                              | 17.7                                                                              | 17.7                                                                              |                                                                                    | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |
| Effective Green, g (s)            | 17.7                                                                              | 17.7                                                                              |                                                                                   | 17.7                                                                              | 17.7                                                                              | 17.7                                                                              |                                                                                    | 18.1                                                                                |                                                                                     | 18.1                                                                                | 18.1                                                                                | 18.1                                                                                |
| Actuated g/C Ratio                | 0.37                                                                              | 0.37                                                                              |                                                                                   | 0.37                                                                              | 0.37                                                                              | 0.37                                                                              |                                                                                    | 0.38                                                                                |                                                                                     | 0.38                                                                                | 0.38                                                                                | 0.38                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 185                                                                               | 625                                                                               |                                                                                   | 271                                                                               | 666                                                                               | 566                                                                               |                                                                                    | 625                                                                                 |                                                                                     | 479                                                                                 | 681                                                                                 | 579                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.29                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     | c0.19                                                                               |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.08                                                                              | 0.24                                                                              |                                                                                   | 0.15                                                                              |                                                                                   | 0.03                                                                              |                                                                                    | 0.05                                                                                |                                                                                     | 0.07                                                                                |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.21                                                                              | 0.65                                                                              |                                                                                   | 0.41                                                                              | 0.80                                                                              | 0.09                                                                              |                                                                                    | 0.12                                                                                |                                                                                     | 0.19                                                                                | 0.51                                                                                | 0.07                                                                                |
| Uniform Delay, d1                 | 10.3                                                                              | 12.5                                                                              |                                                                                   | 11.2                                                                              | 13.4                                                                              | 9.8                                                                               |                                                                                    | 9.7                                                                                 |                                                                                     | 10.0                                                                                | 11.5                                                                                | 9.5                                                                                 |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 0.6                                                                               | 2.5                                                                               |                                                                                   | 1.0                                                                               | 6.6                                                                               | 0.1                                                                               |                                                                                    | 0.4                                                                                 |                                                                                     | 0.9                                                                                 | 2.8                                                                                 | 0.2                                                                                 |
| Delay (s)                         | 10.8                                                                              | 15.0                                                                              |                                                                                   | 12.2                                                                              | 20.0                                                                              | 9.9                                                                               |                                                                                    | 10.1                                                                                |                                                                                     | 10.9                                                                                | 14.2                                                                                | 9.7                                                                                 |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | C                                                                                 | A                                                                                 |                                                                                    | B                                                                                   |                                                                                     | B                                                                                   | B                                                                                   | A                                                                                   |
| Approach Delay (s)                |                                                                                   | 14.6                                                                              |                                                                                   |                                                                                   | 17.1                                                                              |                                                                                   |                                                                                    | 10.1                                                                                |                                                                                     |                                                                                     | 12.8                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 14.9                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.65                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 47.8                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 82.0%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 14                                                                                | 428                                                                               | 0                                                                                 | 0                                                                                 | 779                                                                               | 33                                                                                | 37                                                                                 | 588                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 14                                                                                | 428                                                                               | 0                                                                                 | 0                                                                                 | 779                                                                               | 33                                                                                | 37                                                                                 | 588                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1791                                                                              |                                                                                   |                                                                                    | 1795                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.10                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 173                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1791                                                                              |                                                                                   |                                                                                    | 1795                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 14                                                                                | 428                                                                               | 0                                                                                 | 0                                                                                 | 779                                                                               | 33                                                                                | 37                                                                                 | 588                                                                                 | 52                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 22                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 14                                                                                | 428                                                                               | 0                                                                                 | 0                                                                                 | 810                                                                               | 0                                                                                 | 0                                                                                  | 625                                                                                 | 30                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 41.7                                                                              | 41.7                                                                              |                                                                                   |                                                                                   | 41.7                                                                              |                                                                                   |                                                                                    | 36.0                                                                                | 36.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 41.7                                                                              | 41.7                                                                              |                                                                                   |                                                                                   | 41.7                                                                              |                                                                                   |                                                                                    | 36.0                                                                                | 36.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.46                                                                              | 0.46                                                                              |                                                                                   |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                    | 0.40                                                                                | 0.40                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 80                                                                                | 837                                                                               |                                                                                   |                                                                                   | 832                                                                               |                                                                                   |                                                                                    | 720                                                                                 | 614                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.24                                                                              |                                                                                   |                                                                                   | c0.45                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.35                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.17                                                                              | 0.51                                                                              |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                    | 0.87                                                                                | 0.05                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 14.0                                                                              | 16.8                                                                              |                                                                                   |                                                                                   | 23.5                                                                              |                                                                                   |                                                                                    | 24.7                                                                                | 16.4                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 1.0                                                                               | 0.5                                                                               |                                                                                   |                                                                                   | 24.8                                                                              |                                                                                   |                                                                                    | 13.4                                                                                | 0.2                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 15.0                                                                              | 17.4                                                                              |                                                                                   |                                                                                   | 48.2                                                                              |                                                                                   |                                                                                    | 38.1                                                                                | 16.6                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | D                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 17.3                                                                              |                                                                                   |                                                                                   | 48.2                                                                              |                                                                                   |                                                                                    | 36.4                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 37.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.92                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 89.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 86.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 10                                                                                | 522                                                                               | 4                                                                                 | 58                                                                                | 663                                                                               | 33                                                                                | 26                                                                                 | 190                                                                                 | 53                                                                                  | 103                                                                                 | 214                                                                                 | 20                                                                                  |
| Future Volume (vph)               | 10                                                                                | 522                                                                               | 4                                                                                 | 58                                                                                | 663                                                                               | 33                                                                                | 26                                                                                 | 190                                                                                 | 53                                                                                  | 103                                                                                 | 214                                                                                 | 20                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.97                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1799                                                                              |                                                                                   | 1711                                                                              | 1788                                                                              |                                                                                   |                                                                                    | 1744                                                                                |                                                                                     |                                                                                     | 1759                                                                                |                                                                                     |
| Flt Permitted                     | 0.18                                                                              | 1.00                                                                              |                                                                                   | 0.33                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.94                                                                                |                                                                                     |                                                                                     | 0.81                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 315                                                                               | 1799                                                                              |                                                                                   | 602                                                                               | 1788                                                                              |                                                                                   |                                                                                    | 1651                                                                                |                                                                                     |                                                                                     | 1445                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 10                                                                                | 522                                                                               | 4                                                                                 | 58                                                                                | 663                                                                               | 33                                                                                | 26                                                                                 | 190                                                                                 | 53                                                                                  | 103                                                                                 | 214                                                                                 | 20                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                  | 14                                                                                  | 0                                                                                   | 0                                                                                   | 4                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 10                                                                                | 525                                                                               | 0                                                                                 | 58                                                                                | 693                                                                               | 0                                                                                 | 0                                                                                  | 255                                                                                 | 0                                                                                   | 0                                                                                   | 333                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 25.3                                                                              | 25.3                                                                              |                                                                                   | 25.3                                                                              | 25.3                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 25.3                                                                              | 25.3                                                                              |                                                                                   | 25.3                                                                              | 25.3                                                                              |                                                                                   |                                                                                    | 20.1                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.44                                                                              | 0.44                                                                              |                                                                                   | 0.44                                                                              | 0.44                                                                              |                                                                                   |                                                                                    | 0.35                                                                                |                                                                                     |                                                                                     | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 138                                                                               | 792                                                                               |                                                                                   | 265                                                                               | 788                                                                               |                                                                                   |                                                                                    | 578                                                                                 |                                                                                     |                                                                                     | 506                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.29                                                                              |                                                                                   |                                                                                   | c0.39                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.03                                                                              |                                                                                   |                                                                                   | 0.10                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.15                                                                                |                                                                                     |                                                                                     | c0.23                                                                               |                                                                                     |
| v/c Ratio                         | 0.07                                                                              | 0.66                                                                              |                                                                                   | 0.22                                                                              | 0.88                                                                              |                                                                                   |                                                                                    | 0.44                                                                                |                                                                                     |                                                                                     | 0.66                                                                                |                                                                                     |
| Uniform Delay, d1                 | 9.3                                                                               | 12.7                                                                              |                                                                                   | 9.9                                                                               | 14.7                                                                              |                                                                                   |                                                                                    | 14.3                                                                                |                                                                                     |                                                                                     | 15.7                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.2                                                                               | 2.1                                                                               |                                                                                   | 0.4                                                                               | 10.9                                                                              |                                                                                   |                                                                                    | 2.4                                                                                 |                                                                                     |                                                                                     | 6.6                                                                                 |                                                                                     |
| Delay (s)                         | 9.5                                                                               | 14.8                                                                              |                                                                                   | 10.4                                                                              | 25.6                                                                              |                                                                                   |                                                                                    | 16.8                                                                                |                                                                                     |                                                                                     | 22.3                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 14.7                                                                              |                                                                                   |                                                                                   | 24.4                                                                              |                                                                                   |                                                                                    | 16.8                                                                                |                                                                                     |                                                                                     | 22.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 20.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.78                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 57.4                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 93.9%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

|                                   |  |      |       |      |       |      |                           |       |      |       |      |      |
|-----------------------------------|------------------------------------------------------------------------------------|------|-------|------|-------|------|---------------------------|-------|------|-------|------|------|
| Movement                          | EBL                                                                                | EBT  | EBR   | WBL  | WBT   | WBR  | NBL                       | NBT   | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations               |                                                                                    | ↑↑   |       | ↑    | ↑     | ↑    |                           | ↑     | ↑    | ↑↑    | ↑    |      |
| Traffic Volume (vph)              | 0                                                                                  | 715  | 4     | 231  | 998   | 627  | 0                         | 87    | 185  | 247   | 75   | 48   |
| Future Volume (vph)               | 0                                                                                  | 715  | 4     | 231  | 998   | 627  | 0                         | 87    | 185  | 247   | 75   | 48   |
| Ideal Flow (vphpl)                | 1900                                                                               | 1900 | 1900  | 1900 | 1900  | 1900 | 1900                      | 1900  | 1900 | 1900  | 1900 | 1900 |
| Total Lost time (s)               |                                                                                    | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Lane Util. Factor                 |                                                                                    | 0.95 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.97  | 1.00 |      |
| Frt                               |                                                                                    | 1.00 |       | 1.00 | 1.00  | 0.85 |                           | 1.00  | 0.85 | 1.00  | 0.94 |      |
| Flt Protected                     |                                                                                    | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (prot)                 |                                                                                    | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1695 |      |
| Flt Permitted                     |                                                                                    | 1.00 |       | 0.95 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 0.95  | 1.00 |      |
| Satd. Flow (perm)                 |                                                                                    | 3418 |       | 1711 | 1801  | 1531 |                           | 1801  | 1531 | 3319  | 1695 |      |
| Peak-hour factor, PHF             | 1.00                                                                               | 1.00 | 1.00  | 1.00 | 1.00  | 1.00 | 1.00                      | 1.00  | 1.00 | 1.00  | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0                                                                                  | 715  | 4     | 231  | 998   | 627  | 0                         | 87    | 185  | 247   | 75   | 48   |
| RTOR Reduction (vph)              | 0                                                                                  | 1    | 0     | 0    | 0     | 0    | 0                         | 0     | 164  | 0     | 0    | 0    |
| Lane Group Flow (vph)             | 0                                                                                  | 718  | 0     | 231  | 998   | 627  | 0                         | 87    | 21   | 247   | 123  | 0    |
| Turn Type                         |                                                                                    | NA   |       | Prot | NA    | Prot |                           | NA    | Perm | Prot  | NA   |      |
| Protected Phases                  |                                                                                    | 4    |       | 3    | 8     | 8    |                           | 2     |      | 1     | 6    |      |
| Permitted Phases                  |                                                                                    |      |       |      |       |      |                           |       | 2    |       |      |      |
| Actuated Green, G (s)             |                                                                                    | 26.6 |       | 14.5 | 47.1  | 47.1 |                           | 9.4   | 9.4  | 7.0   | 22.4 |      |
| Effective Green, g (s)            |                                                                                    | 26.6 |       | 14.5 | 47.1  | 47.1 |                           | 9.4   | 9.4  | 7.0   | 22.4 |      |
| Actuated g/C Ratio                |                                                                                    | 0.33 |       | 0.18 | 0.58  | 0.58 |                           | 0.12  | 0.12 | 0.09  | 0.27 |      |
| Clearance Time (s)                |                                                                                    | 6.0  |       | 6.0  | 6.0   | 6.0  |                           | 6.0   | 6.0  | 6.0   | 6.0  |      |
| Vehicle Extension (s)             |                                                                                    | 3.0  |       | 3.0  | 3.0   | 3.0  |                           | 3.0   | 3.0  | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)                |                                                                                    | 1115 |       | 304  | 1040  | 884  |                           | 207   | 176  | 285   | 465  |      |
| v/s Ratio Prot                    |                                                                                    | 0.21 |       | 0.14 | c0.55 | 0.41 |                           | c0.05 |      | c0.07 | 0.07 |      |
| v/s Ratio Perm                    |                                                                                    |      |       |      |       |      |                           |       | 0.01 |       |      |      |
| v/c Ratio                         |                                                                                    | 0.64 |       | 0.76 | 0.96  | 0.71 |                           | 0.42  | 0.12 | 0.87  | 0.26 |      |
| Uniform Delay, d1                 |                                                                                    | 23.4 |       | 31.8 | 16.3  | 12.3 |                           | 33.5  | 32.3 | 36.8  | 23.1 |      |
| Progression Factor                |                                                                                    | 1.00 |       | 1.00 | 1.00  | 1.00 |                           | 1.00  | 1.00 | 1.00  | 1.00 |      |
| Incremental Delay, d2             |                                                                                    | 2.9  |       | 10.4 | 19.7  | 4.8  |                           | 1.4   | 0.3  | 23.0  | 0.3  |      |
| Delay (s)                         |                                                                                    | 26.3 |       | 42.3 | 36.0  | 17.1 |                           | 34.9  | 32.7 | 59.8  | 23.4 |      |
| Level of Service                  |                                                                                    | C    |       | D    | D     | B    |                           | C     | C    | E     | C    |      |
| Approach Delay (s)                |                                                                                    | 26.3 |       |      | 30.4  |      |                           | 33.4  |      |       | 47.7 |      |
| Approach LOS                      |                                                                                    | C    |       |      | C     |      |                           | C     |      |       | D    |      |
| <b>Intersection Summary</b>       |                                                                                    |      |       |      |       |      |                           |       |      |       |      |      |
| HCM 2000 Control Delay            |                                                                                    |      | 31.7  |      |       |      | HCM 2000 Level of Service |       |      | C     |      |      |
| HCM 2000 Volume to Capacity ratio |                                                                                    |      | 0.96  |      |       |      |                           |       |      |       |      |      |
| Actuated Cycle Length (s)         |                                                                                    |      | 81.5  |      |       |      | Sum of lost time (s)      |       | 24.0 |       |      |      |
| Intersection Capacity Utilization |                                                                                    |      | 76.2% |      |       |      | ICU Level of Service      |       | D    |       |      |      |
| Analysis Period (min)             |                                                                                    |      | 15    |      |       |      |                           |       |      |       |      |      |
| c Critical Lane Group             |                                                                                    |      |       |      |       |      |                           |       |      |       |      |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 3: Pine St &amp; Bank St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |
| Traffic Volume (vph)              | 125                                                                               | 0                                                                                 | 3                                                                                 | 117                                                                               | 0                                                                                 | 18                                                                                |
| Future Volume (vph)               | 125                                                                               | 0                                                                                 | 3                                                                                 | 117                                                                               | 0                                                                                 | 18                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               | 6.0                                                                               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |
| Lane Util. Factor                 | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Frt                               | 1.00                                                                              |                                                                                   | 0.87                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Flt Protected                     | 0.95                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Satd. Flow (prot)                 | 1711                                                                              |                                                                                   | 1564                                                                              |                                                                                   |                                                                                   | 1801                                                                              |
| Flt Permitted                     | 0.95                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Satd. Flow (perm)                 | 1711                                                                              |                                                                                   | 1564                                                                              |                                                                                   |                                                                                   | 1801                                                                              |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                   | 125                                                                               | 0                                                                                 | 3                                                                                 | 117                                                                               | 0                                                                                 | 18                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 49                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Lane Group Flow (vph)             | 125                                                                               | 0                                                                                 | 71                                                                                | 0                                                                                 | 0                                                                                 | 18                                                                                |
| Turn Type                         | Prot                                                                              |                                                                                   | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |
| Protected Phases                  | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |
| Permitted Phases                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |
| Actuated Green, G (s)             | 7.2                                                                               |                                                                                   | 26.4                                                                              |                                                                                   |                                                                                   | 26.4                                                                              |
| Effective Green, g (s)            | 7.2                                                                               |                                                                                   | 26.4                                                                              |                                                                                   |                                                                                   | 26.4                                                                              |
| Actuated g/C Ratio                | 0.16                                                                              |                                                                                   | 0.58                                                                              |                                                                                   |                                                                                   | 0.58                                                                              |
| Clearance Time (s)                | 6.0                                                                               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |
| Vehicle Extension (s)             | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |
| Lane Grp Cap (vph)                | 270                                                                               |                                                                                   | 905                                                                               |                                                                                   |                                                                                   | 1042                                                                              |
| v/s Ratio Prot                    | c0.07                                                                             |                                                                                   | c0.05                                                                             |                                                                                   |                                                                                   | 0.01                                                                              |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| v/c Ratio                         | 0.46                                                                              |                                                                                   | 0.08                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |
| Uniform Delay, d1                 | 17.4                                                                              |                                                                                   | 4.2                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |
| Progression Factor                | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Incremental Delay, d2             | 1.3                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |
| Delay (s)                         | 18.7                                                                              |                                                                                   | 4.4                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |
| Level of Service                  | B                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |
| Approach Delay (s)                | 18.7                                                                              |                                                                                   | 4.4                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |
| Approach LOS                      | B                                                                                 |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 11.2                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.16                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 45.6                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 24.3%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 4: Pine St &amp; Cherry St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 89                                                                                | 117                                                                               | 0                                                                                 | 0                                                                                 | 124                                                                               | 260                                                                               | 0                                                                                  | 3                                                                                   | 0                                                                                   | 74                                                                                  | 18                                                                                  | 34                                                                                  |
| Future Volume (vph)               | 89                                                                                | 117                                                                               | 0                                                                                 | 0                                                                                 | 124                                                                               | 260                                                                               | 0                                                                                  | 3                                                                                   | 0                                                                                   | 74                                                                                  | 18                                                                                  | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.91                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1763                                                                              |                                                                                   |                                                                                   | 1636                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1686                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.84                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 995                                                                               |                                                                                   |                                                                                   | 1636                                                                              |                                                                                   |                                                                                    | 1801                                                                                |                                                                                     |                                                                                     | 1462                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 89                                                                                | 117                                                                               | 0                                                                                 | 0                                                                                 | 124                                                                               | 260                                                                               | 0                                                                                  | 3                                                                                   | 0                                                                                   | 74                                                                                  | 18                                                                                  | 34                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 173                                                                               | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 19                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 206                                                                               | 0                                                                                 | 0                                                                                 | 211                                                                               | 0                                                                                 | 0                                                                                  | 3                                                                                   | 0                                                                                   | 0                                                                                   | 107                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   |                                                                                    | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                    | 19.2                                                                                |                                                                                     |                                                                                     | 19.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                    | 19.2                                                                                |                                                                                     |                                                                                     | 19.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.29                                                                              |                                                                                   |                                                                                   | 0.29                                                                              |                                                                                   |                                                                                    | 0.44                                                                                |                                                                                     |                                                                                     | 0.44                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 284                                                                               |                                                                                   |                                                                                   | 467                                                                               |                                                                                   |                                                                                    | 791                                                                                 |                                                                                     |                                                                                     | 642                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.13                                                                              |                                                                                   |                                                                                    | 0.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.21                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.07                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.73                                                                              |                                                                                   |                                                                                   | 0.45                                                                              |                                                                                   |                                                                                    | 0.00                                                                                |                                                                                     |                                                                                     | 0.17                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 14.1                                                                              |                                                                                   |                                                                                   | 12.8                                                                              |                                                                                   |                                                                                    | 6.9                                                                                 |                                                                                     |                                                                                     | 7.4                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 8.9                                                                               |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.6                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 22.9                                                                              |                                                                                   |                                                                                   | 13.5                                                                              |                                                                                   |                                                                                    | 6.9                                                                                 |                                                                                     |                                                                                     | 8.0                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 22.9                                                                              |                                                                                   |                                                                                   | 13.5                                                                              |                                                                                   |                                                                                    | 6.9                                                                                 |                                                                                     |                                                                                     | 8.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 15.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 43.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 62.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 5: Battery St/Park St &amp; Pearl St

12/12/2016

|                                                                 |  |  |  |  |  |  |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                                                        | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations                                             |  |  |  |  |                                                                                   |  |
| Traffic Volume (vph)                                            | 156                                                                               | 171                                                                               | 859                                                                               | 501                                                                               | 180                                                                               | 643                                                                               |
| Future Volume (vph)                                             | 156                                                                               | 171                                                                               | 859                                                                               | 501                                                                               | 180                                                                               | 643                                                                               |
| Ideal Flow (vphpl)                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)                                             | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               |
| Lane Util. Factor                                               | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                              |                                                                                   | 0.95                                                                              |
| Frt                                                             | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              |
| Flt Protected                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              |
| Satd. Flow (prot)                                               | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                                                                                   | 3384                                                                              |
| Flt Permitted                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.54                                                                              |
| Satd. Flow (perm)                                               | 1711                                                                              | 1531                                                                              | 1801                                                                              | 2694                                                                              |                                                                                   | 1864                                                                              |
| Peak-hour factor, PHF                                           | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Adj. Flow (vph)                                                 | 156                                                                               | 171                                                                               | 859                                                                               | 501                                                                               | 180                                                                               | 643                                                                               |
| RTOR Reduction (vph)                                            | 0                                                                                 | 91                                                                                | 0                                                                                 | 203                                                                               | 0                                                                                 | 0                                                                                 |
| Lane Group Flow (vph)                                           | 156                                                                               | 80                                                                                | 859                                                                               | 298                                                                               | 0                                                                                 | 823                                                                               |
| Turn Type                                                       | Prot                                                                              | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |
| Protected Phases                                                | 8                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |
| Permitted Phases                                                |                                                                                   | 8                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |
| Actuated Green, G (s)                                           | 10.3                                                                              | 10.3                                                                              | 32.8                                                                              | 32.8                                                                              |                                                                                   | 32.8                                                                              |
| Effective Green, g (s)                                          | 10.3                                                                              | 10.3                                                                              | 32.8                                                                              | 32.8                                                                              |                                                                                   | 32.8                                                                              |
| Actuated g/C Ratio                                              | 0.19                                                                              | 0.19                                                                              | 0.60                                                                              | 0.60                                                                              |                                                                                   | 0.60                                                                              |
| Clearance Time (s)                                              | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               |
| Vehicle Extension (s)                                           | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |
| Lane Grp Cap (vph)                                              | 319                                                                               | 286                                                                               | 1072                                                                              | 1603                                                                              |                                                                                   | 1109                                                                              |
| v/s Ratio Prot                                                  | c0.09                                                                             |                                                                                   | c0.48                                                                             |                                                                                   |                                                                                   |                                                                                   |
| v/s Ratio Perm                                                  |                                                                                   | 0.05                                                                              |                                                                                   | 0.11                                                                              |                                                                                   | 0.44                                                                              |
| v/c Ratio                                                       | 0.49                                                                              | 0.28                                                                              | 0.80                                                                              | 0.19                                                                              |                                                                                   | 0.87dl                                                                            |
| Uniform Delay, d1                                               | 20.0                                                                              | 19.2                                                                              | 8.6                                                                               | 5.1                                                                               |                                                                                   | 8.1                                                                               |
| Progression Factor                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |
| Incremental Delay, d2                                           | 1.2                                                                               | 0.5                                                                               | 6.3                                                                               | 0.3                                                                               |                                                                                   | 4.5                                                                               |
| Delay (s)                                                       | 21.2                                                                              | 19.8                                                                              | 15.0                                                                              | 5.3                                                                               |                                                                                   | 12.6                                                                              |
| Level of Service                                                | C                                                                                 | B                                                                                 | B                                                                                 | A                                                                                 |                                                                                   | B                                                                                 |
| Approach Delay (s)                                              | 20.5                                                                              |                                                                                   | 11.4                                                                              |                                                                                   |                                                                                   | 12.6                                                                              |
| Approach LOS                                                    | C                                                                                 |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |
| <b>Intersection Summary</b>                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay                                          |                                                                                   |                                                                                   | 13.0                                                                              |                                                                                   | HCM 2000 Level of Service                                                         | B                                                                                 |
| HCM 2000 Volume to Capacity ratio                               |                                                                                   |                                                                                   | 0.73                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)                                       |                                                                                   |                                                                                   | 55.1                                                                              |                                                                                   | Sum of lost time (s)                                                              | 12.0                                                                              |
| Intersection Capacity Utilization                               |                                                                                   |                                                                                   | 91.9%                                                                             |                                                                                   | ICU Level of Service                                                              | F                                                                                 |
| Analysis Period (min)                                           |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 6: Pine St &amp; Pearl St

12/12/2016

|                                   | →    | ↘    | ↙     | ←     | ↖                         | ↗    |
|-----------------------------------|------|------|-------|-------|---------------------------|------|
| Movement                          | EBT  | EBR  | WBL   | WBT   | NBL                       | NBR  |
| Lane Configurations               | ↰    |      |       | ↱     | ↰                         | ↱    |
| Traffic Volume (vph)              | 434  | 44   | 76    | 459   | 91                        | 158  |
| Future Volume (vph)               | 434  | 44   | 76    | 459   | 91                        | 158  |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900                      | 1900 |
| Total Lost time (s)               | 6.0  |      |       | 6.0   | 6.0                       |      |
| Lane Util. Factor                 | 1.00 |      |       | 1.00  | 1.00                      |      |
| Frt                               | 0.99 |      |       | 1.00  | 0.91                      |      |
| Flt Protected                     | 1.00 |      |       | 0.99  | 0.98                      |      |
| Satd. Flow (prot)                 | 1778 |      |       | 1788  | 1617                      |      |
| Flt Permitted                     | 1.00 |      |       | 0.79  | 0.98                      |      |
| Satd. Flow (perm)                 | 1778 |      |       | 1429  | 1617                      |      |
| Peak-hour factor, PHF             | 1.00 | 1.00 | 1.00  | 1.00  | 1.00                      | 1.00 |
| Adj. Flow (vph)                   | 434  | 44   | 76    | 459   | 91                        | 158  |
| RTOR Reduction (vph)              | 7    | 0    | 0     | 0     | 97                        | 0    |
| Lane Group Flow (vph)             | 471  | 0    | 0     | 535   | 152                       | 0    |
| Turn Type                         | NA   |      | Perm  | NA    | Prot                      |      |
| Protected Phases                  | 4    |      |       | 8     | 2                         |      |
| Permitted Phases                  |      |      | 8     |       |                           |      |
| Actuated Green, G (s)             | 22.5 |      |       | 22.5  | 18.3                      |      |
| Effective Green, g (s)            | 22.5 |      |       | 22.5  | 18.3                      |      |
| Actuated g/C Ratio                | 0.43 |      |       | 0.43  | 0.35                      |      |
| Clearance Time (s)                | 6.0  |      |       | 6.0   | 6.0                       |      |
| Vehicle Extension (s)             | 3.0  |      |       | 3.0   | 3.0                       |      |
| Lane Grp Cap (vph)                | 757  |      |       | 608   | 560                       |      |
| v/s Ratio Prot                    | 0.26 |      |       |       | c0.09                     |      |
| v/s Ratio Perm                    |      |      |       | c0.37 |                           |      |
| v/c Ratio                         | 0.62 |      |       | 0.88  | 0.27                      |      |
| Uniform Delay, d1                 | 11.8 |      |       | 13.9  | 12.4                      |      |
| Progression Factor                | 1.00 |      |       | 1.00  | 1.00                      |      |
| Incremental Delay, d2             | 1.6  |      |       | 13.7  | 1.2                       |      |
| Delay (s)                         | 13.4 |      |       | 27.6  | 13.6                      |      |
| Level of Service                  | B    |      |       | C     | B                         |      |
| Approach Delay (s)                | 13.4 |      |       | 27.6  | 13.6                      |      |
| Approach LOS                      | B    |      |       | C     | B                         |      |
| <b>Intersection Summary</b>       |      |      |       |       |                           |      |
| HCM 2000 Control Delay            |      |      | 19.5  |       | HCM 2000 Level of Service | B    |
| HCM 2000 Volume to Capacity ratio |      |      | 0.61  |       |                           |      |
| Actuated Cycle Length (s)         |      |      | 52.8  |       | Sum of lost time (s)      | 12.0 |
| Intersection Capacity Utilization |      |      | 83.6% |       | ICU Level of Service      | E    |
| Analysis Period (min)             |      |      | 15    |       |                           |      |
| c Critical Lane Group             |      |      |       |       |                           |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 7: S Winooski Ave/N Winooski Ave &amp; Pearl St

12/12/2016

| Movement                          | EBL  | EBT   | EBR   | WBL   | WBT  | WBR                       | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|-------|-------|-------|------|---------------------------|-------|------|------|------|------|------|
| Lane Configurations               |      | ↑     | ↑     | ↑     | ↑    |                           | ↑     |      | ↑    | ↑    | ↑↓   | ↑    |
| Traffic Volume (vph)              | 0    | 381   | 118   | 215   | 449  | 0                         | 201   | 0    | 323  | 107  | 321  | 51   |
| Future Volume (vph)               | 0    | 381   | 118   | 215   | 449  | 0                         | 201   | 0    | 323  | 107  | 321  | 51   |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900  | 1900  | 1900 | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               |      | 6.0   | 6.0   | 6.0   | 6.0  |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Lane Util. Factor                 |      | 1.00  | 1.00  | 1.00  | 1.00 |                           | 1.00  |      | 1.00 | 1.00 | 0.95 |      |
| Frt                               |      | 1.00  | 0.85  | 1.00  | 1.00 |                           | 1.00  |      | 0.85 | 1.00 | 0.98 |      |
| Flt Protected                     |      | 1.00  | 1.00  | 0.95  | 1.00 |                           | 0.95  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (prot)                 |      | 1801  | 1531  | 1711  | 1801 |                           | 1711  |      | 1531 | 1711 | 3351 |      |
| Flt Permitted                     |      | 1.00  | 1.00  | 0.95  | 1.00 |                           | 0.53  |      | 1.00 | 0.95 | 1.00 |      |
| Satd. Flow (perm)                 |      | 1801  | 1531  | 1711  | 1801 |                           | 955   |      | 1531 | 1711 | 3351 |      |
| Peak-hour factor, PHF             | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph)                   | 0    | 381   | 118   | 215   | 449  | 0                         | 201   | 0    | 323  | 107  | 321  | 51   |
| RTOR Reduction (vph)              | 0    | 0     | 0     | 0     | 0    | 0                         | 0     | 0    | 223  | 0    | 0    | 0    |
| Lane Group Flow (vph)             | 0    | 381   | 118   | 215   | 449  | 0                         | 201   | 0    | 100  | 107  | 372  | 0    |
| Turn Type                         |      | NA    | Perm  | Prot  | NA   |                           | Perm  |      | Perm | Perm | NA   |      |
| Protected Phases                  |      | 4     |       | 3     | 8    |                           |       |      |      |      | 6    |      |
| Permitted Phases                  |      |       | 4     |       |      |                           | 2     |      | 2    | 6    |      |      |
| Actuated Green, G (s)             |      | 15.8  | 15.8  | 6.1   | 27.9 |                           | 18.0  |      | 18.0 | 18.0 | 18.0 |      |
| Effective Green, g (s)            |      | 15.8  | 15.8  | 6.1   | 27.9 |                           | 18.0  |      | 18.0 | 18.0 | 18.0 |      |
| Actuated g/C Ratio                |      | 0.27  | 0.27  | 0.11  | 0.48 |                           | 0.31  |      | 0.31 | 0.31 | 0.31 |      |
| Clearance Time (s)                |      | 6.0   | 6.0   | 6.0   | 6.0  |                           | 6.0   |      | 6.0  | 6.0  | 6.0  |      |
| Vehicle Extension (s)             |      | 3.0   | 3.0   | 3.0   | 3.0  |                           | 3.0   |      | 3.0  | 3.0  | 3.0  |      |
| Lane Grp Cap (vph)                |      | 491   | 417   | 180   | 867  |                           | 296   |      | 475  | 531  | 1041 |      |
| v/s Ratio Prot                    |      | c0.21 |       | c0.13 | 0.25 |                           |       |      |      |      | 0.11 |      |
| v/s Ratio Perm                    |      |       | 0.08  |       |      |                           | c0.21 |      | 0.07 | 0.06 |      |      |
| v/c Ratio                         |      | 0.78  | 0.28  | 1.19  | 0.52 |                           | 0.68  |      | 0.21 | 0.20 | 0.36 |      |
| Uniform Delay, d1                 |      | 19.4  | 16.6  | 25.9  | 10.4 |                           | 17.4  |      | 14.7 | 14.7 | 15.5 |      |
| Progression Factor                |      | 1.00  | 1.00  | 1.00  | 1.00 |                           | 1.00  |      | 1.00 | 1.00 | 1.00 |      |
| Incremental Delay, d2             |      | 7.5   | 0.4   | 129.1 | 0.5  |                           | 11.9  |      | 1.0  | 0.9  | 1.0  |      |
| Delay (s)                         |      | 27.0  | 17.0  | 155.0 | 10.9 |                           | 29.3  |      | 15.7 | 15.5 | 16.4 |      |
| Level of Service                  |      | C     | B     | F     | B    |                           | C     |      | B    | B    | B    |      |
| Approach Delay (s)                |      | 24.6  |       |       | 57.6 |                           |       | 20.9 |      |      | 16.2 |      |
| Approach LOS                      |      | C     |       |       | E    |                           |       | C    |      |      | B    |      |
| <b>Intersection Summary</b>       |      |       |       |       |      |                           |       |      |      |      |      |      |
| HCM 2000 Control Delay            |      |       | 32.0  |       |      | HCM 2000 Level of Service |       |      | C    |      |      |      |
| HCM 2000 Volume to Capacity ratio |      |       | 0.79  |       |      |                           |       |      |      |      |      |      |
| Actuated Cycle Length (s)         |      |       | 57.9  |       |      | Sum of lost time (s)      |       |      | 18.0 |      |      |      |
| Intersection Capacity Utilization |      |       | 71.9% |       |      | ICU Level of Service      |       |      | C    |      |      |      |
| Analysis Period (min)             |      |       | 15    |       |      |                           |       |      |      |      |      |      |
| c Critical Lane Group             |      |       |       |       |      |                           |       |      |      |      |      |      |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 8: S Union St/N Union St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 168                                                                               | 592                                                                               | 0                                                                                 | 0                                                                                 | 580                                                                               | 65                                                                                | 52                                                                                  | 311                                                                                 | 56                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 168                                                                               | 592                                                                               | 0                                                                                 | 0                                                                                 | 580                                                                               | 65                                                                                | 52                                                                                  | 311                                                                                 | 56                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                                | 0.98                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1776                                                                              |                                                                                   | 1711                                                                                | 1759                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.22                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 405                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1776                                                                              |                                                                                   | 1711                                                                                | 1759                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 168                                                                               | 592                                                                               | 0                                                                                 | 0                                                                                 | 580                                                                               | 65                                                                                | 52                                                                                  | 311                                                                                 | 56                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                   | 10                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 168                                                                               | 592                                                                               | 0                                                                                 | 0                                                                                 | 638                                                                               | 0                                                                                 | 52                                                                                  | 357                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 24.6                                                                              | 24.6                                                                              |                                                                                   |                                                                                   | 24.6                                                                              |                                                                                   | 19.2                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 24.6                                                                              | 24.6                                                                              |                                                                                   |                                                                                   | 24.6                                                                              |                                                                                   | 19.2                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.44                                                                              | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   | 0.34                                                                                | 0.34                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 178                                                                               | 793                                                                               |                                                                                   |                                                                                   | 782                                                                               |                                                                                   | 588                                                                                 | 605                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.33                                                                              |                                                                                   |                                                                                   | 0.36                                                                              |                                                                                   |                                                                                     | c0.20                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | c0.41                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.03                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.94                                                                              | 0.75                                                                              |                                                                                   |                                                                                   | 0.82                                                                              |                                                                                   | 0.09                                                                                | 0.59                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 14.9                                                                              | 13.0                                                                              |                                                                                   |                                                                                   | 13.6                                                                              |                                                                                   | 12.4                                                                                | 15.1                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 50.9                                                                              | 3.9                                                                               |                                                                                   |                                                                                   | 6.6                                                                               |                                                                                   | 0.3                                                                                 | 4.2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 65.9                                                                              | 16.9                                                                              |                                                                                   |                                                                                   | 20.2                                                                              |                                                                                   | 12.7                                                                                | 19.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | E                                                                                 | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                   | 20.2                                                                              |                                                                                   |                                                                                     | 18.4                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 22.9                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.79                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 55.8                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 78.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 9: S Willard St/N Willard St &amp; Pearl St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 65                                                                                | 569                                                                               | 47                                                                                | 60                                                                                | 558                                                                               | 47                                                                                | 67                                                                                 | 271                                                                                 | 59                                                                                  | 29                                                                                  | 194                                                                                 | 39                                                                                  |
| Future Volume (vph)               | 65                                                                                | 569                                                                               | 47                                                                                | 60                                                                                | 558                                                                               | 47                                                                                | 67                                                                                 | 271                                                                                 | 59                                                                                  | 29                                                                                  | 194                                                                                 | 39                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1775                                                                              |                                                                                   | 1711                                                                              | 1780                                                                              |                                                                                   |                                                                                    | 1750                                                                                |                                                                                     |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.81                                                                              |                                                                                   | 0.36                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.89                                                                                |                                                                                     |                                                                                     | 0.93                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1443                                                                              |                                                                                   | 652                                                                               | 1780                                                                              |                                                                                   |                                                                                    | 1576                                                                                |                                                                                     |                                                                                     | 1634                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 65                                                                                | 569                                                                               | 47                                                                                | 60                                                                                | 558                                                                               | 47                                                                                | 67                                                                                 | 271                                                                                 | 59                                                                                  | 29                                                                                  | 194                                                                                 | 39                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                  | 11                                                                                  | 0                                                                                   | 0                                                                                   | 11                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 677                                                                               | 0                                                                                 | 60                                                                                | 600                                                                               | 0                                                                                 | 0                                                                                  | 387                                                                                 | 0                                                                                   | 0                                                                                   | 252                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 30.0                                                                              |                                                                                   | 30.0                                                                              | 30.0                                                                              |                                                                                   |                                                                                    | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 30.0                                                                              |                                                                                   | 30.0                                                                              | 30.0                                                                              |                                                                                   |                                                                                    | 18.0                                                                                |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.50                                                                              |                                                                                   | 0.50                                                                              | 0.50                                                                              |                                                                                   |                                                                                    | 0.30                                                                                |                                                                                     |                                                                                     | 0.30                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 721                                                                               |                                                                                   | 326                                                                               | 890                                                                               |                                                                                   |                                                                                    | 472                                                                                 |                                                                                     |                                                                                     | 490                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.34                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.47                                                                             |                                                                                   | 0.09                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.25                                                                               |                                                                                     |                                                                                     | 0.15                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.94                                                                              |                                                                                   | 0.18                                                                              | 0.67                                                                              |                                                                                   |                                                                                    | 0.82                                                                                |                                                                                     |                                                                                     | 0.51                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 14.1                                                                              |                                                                                   | 8.3                                                                               | 11.3                                                                              |                                                                                   |                                                                                    | 19.5                                                                                |                                                                                     |                                                                                     | 17.4                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 21.4                                                                              |                                                                                   | 1.2                                                                               | 4.1                                                                               |                                                                                   |                                                                                    | 14.6                                                                                |                                                                                     |                                                                                     | 3.8                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 35.6                                                                              |                                                                                   | 9.5                                                                               | 15.4                                                                              |                                                                                   |                                                                                    | 34.1                                                                                |                                                                                     |                                                                                     | 21.2                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 35.6                                                                              |                                                                                   |                                                                                   | 14.9                                                                              |                                                                                   |                                                                                    | 34.1                                                                                |                                                                                     |                                                                                     | 21.2                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 26.5                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 60.0                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 116.8%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 10: S Propsect St/N Prospect St &amp; Pearl St/Colchester Ave

12/12/2016

| Movement                          | EBL  | EBT   | EBR    | WBL   | WBT   | WBR                       | NBL   | NBT   | NBR  | SBL  | SBT   | SBR  |
|-----------------------------------|------|-------|--------|-------|-------|---------------------------|-------|-------|------|------|-------|------|
| Lane Configurations               |      | ↔     |        | ↔     | ↔     |                           | ↔     | ↑     | ↔    |      | ↔     |      |
| Traffic Volume (vph)              | 0    | 550   | 58     | 151   | 625   | 92                        | 155   | 260   | 193  | 27   | 118   | 12   |
| Future Volume (vph)               | 0    | 550   | 58     | 151   | 625   | 92                        | 155   | 260   | 193  | 27   | 118   | 12   |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900   | 1900  | 1900  | 1900                      | 1900  | 1900  | 1900 | 1900 | 1900  | 1900 |
| Total Lost time (s)               |      | 6.0   |        | 6.0   | 6.0   |                           | 6.0   | 6.0   | 6.0  |      | 6.0   |      |
| Lane Util. Factor                 |      | 1.00  |        | 1.00  | 1.00  |                           | 1.00  | 1.00  | 1.00 |      | 1.00  |      |
| Frt                               |      | 0.99  |        | 1.00  | 0.98  |                           | 1.00  | 1.00  | 0.85 |      | 0.99  |      |
| Flt Protected                     |      | 1.00  |        | 0.95  | 1.00  |                           | 0.95  | 1.00  | 1.00 |      | 0.99  |      |
| Satd. Flow (prot)                 |      | 1777  |        | 1711  | 1766  |                           | 1711  | 1801  | 1531 |      | 1767  |      |
| Flt Permitted                     |      | 1.00  |        | 0.15  | 1.00  |                           | 0.95  | 1.00  | 1.00 |      | 0.99  |      |
| Satd. Flow (perm)                 |      | 1777  |        | 268   | 1766  |                           | 1711  | 1801  | 1531 |      | 1767  |      |
| Peak-hour factor, PHF             | 1.00 | 1.00  | 1.00   | 1.00  | 1.00  | 1.00                      | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00 |
| Adj. Flow (vph)                   | 0    | 550   | 58     | 151   | 625   | 92                        | 155   | 260   | 193  | 27   | 118   | 12   |
| RTOR Reduction (vph)              | 0    | 4     | 0      | 0     | 0     | 0                         | 0     | 0     | 157  | 0    | 3     | 0    |
| Lane Group Flow (vph)             | 0    | 604   | 0      | 151   | 717   | 0                         | 155   | 260   | 36   | 0    | 154   | 0    |
| Turn Type                         |      | NA    |        | pm+pt | NA    |                           | Split | NA    | Perm |      | Split | NA   |
| Protected Phases                  |      | 4     |        | 3     | 8     |                           | 2     | 2     |      |      | 6     | 6    |
| Permitted Phases                  | 4    |       |        | 8     |       |                           |       |       | 2    |      |       |      |
| Actuated Green, G (s)             |      | 30.1  |        | 41.2  | 41.2  |                           | 16.4  | 16.4  | 16.4 |      | 12.8  |      |
| Effective Green, g (s)            |      | 30.1  |        | 41.2  | 41.2  |                           | 16.4  | 16.4  | 16.4 |      | 12.8  |      |
| Actuated g/C Ratio                |      | 0.34  |        | 0.47  | 0.47  |                           | 0.19  | 0.19  | 0.19 |      | 0.14  |      |
| Clearance Time (s)                |      | 6.0   |        | 6.0   | 6.0   |                           | 6.0   | 6.0   | 6.0  |      | 6.0   |      |
| Vehicle Extension (s)             |      | 3.0   |        | 3.0   | 3.0   |                           | 3.0   | 3.0   | 3.0  |      | 3.0   |      |
| Lane Grp Cap (vph)                |      | 605   |        | 208   | 823   |                           | 317   | 334   | 284  |      | 255   |      |
| v/s Ratio Prot                    |      | c0.34 |        | 0.04  | c0.41 |                           | 0.09  | c0.14 |      |      | c0.09 |      |
| v/s Ratio Perm                    |      |       |        | 0.30  |       |                           |       |       | 0.02 |      |       |      |
| v/c Ratio                         |      | 1.00  |        | 0.73  | 0.87  |                           | 0.49  | 0.78  | 0.13 |      | 0.60  |      |
| Uniform Delay, d1                 |      | 29.1  |        | 33.7  | 21.2  |                           | 32.2  | 34.3  | 30.0 |      | 35.4  |      |
| Progression Factor                |      | 1.00  |        | 1.00  | 1.00  |                           | 1.00  | 1.00  | 1.00 |      | 1.00  |      |
| Incremental Delay, d2             |      | 36.2  |        | 11.9  | 12.2  |                           | 1.2   | 10.9  | 0.2  |      | 4.0   |      |
| Delay (s)                         |      | 65.3  |        | 45.6  | 33.4  |                           | 33.4  | 45.2  | 30.2 |      | 39.4  |      |
| Level of Service                  |      | E     |        | D     | C     |                           | C     | D     | C    |      | D     |      |
| Approach Delay (s)                |      | 65.3  |        |       | 35.5  |                           |       | 37.4  |      |      | 39.4  |      |
| Approach LOS                      |      | E     |        |       | D     |                           |       | D     |      |      | D     |      |
| <b>Intersection Summary</b>       |      |       |        |       |       |                           |       |       |      |      |       |      |
| HCM 2000 Control Delay            |      |       | 44.4   |       |       | HCM 2000 Level of Service |       |       | D    |      |       |      |
| HCM 2000 Volume to Capacity ratio |      |       | 0.89   |       |       |                           |       |       |      |      |       |      |
| Actuated Cycle Length (s)         |      |       | 88.4   |       |       | Sum of lost time (s)      |       |       | 24.0 |      |       |      |
| Intersection Capacity Utilization |      |       | 113.1% |       |       | ICU Level of Service      |       |       | H    |      |       |      |
| Analysis Period (min)             |      |       | 15     |       |       |                           |       |       |      |      |       |      |
| c Critical Lane Group             |      |       |        |       |       |                           |       |       |      |      |       |      |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 13: Pine St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 16                                                                                | 372                                                                               | 90                                                                                | 78                                                                                | 467                                                                               | 96                                                                                | 57                                                                                 | 114                                                                                 | 58                                                                                  | 148                                                                                 | 236                                                                                 | 23                                                                                  |
| Future Volume (vph)               | 16                                                                                | 372                                                                               | 90                                                                                | 78                                                                                | 467                                                                               | 96                                                                                | 57                                                                                 | 114                                                                                 | 58                                                                                  | 148                                                                                 | 236                                                                                 | 23                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.98                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1752                                                                              |                                                                                   |                                                                                   | 1754                                                                              |                                                                                   |                                                                                    | 1771                                                                                | 1531                                                                                |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   | 0.90                                                                              |                                                                                   |                                                                                    | 0.79                                                                                | 1.00                                                                                |                                                                                     | 0.81                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1706                                                                              |                                                                                   |                                                                                   | 1579                                                                              |                                                                                   |                                                                                    | 1420                                                                                | 1531                                                                                |                                                                                     | 1446                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 16                                                                                | 372                                                                               | 90                                                                                | 78                                                                                | 467                                                                               | 96                                                                                | 57                                                                                 | 114                                                                                 | 58                                                                                  | 148                                                                                 | 236                                                                                 | 23                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 14                                                                                | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 38                                                                                  | 0                                                                                   | 3                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 464                                                                               | 0                                                                                 | 0                                                                                 | 630                                                                               | 0                                                                                 | 0                                                                                  | 171                                                                                 | 20                                                                                  | 0                                                                                   | 404                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 25.6                                                                              |                                                                                   |                                                                                   | 25.6                                                                              |                                                                                   |                                                                                    | 20.1                                                                                | 20.1                                                                                |                                                                                     | 20.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 25.6                                                                              |                                                                                   |                                                                                   | 25.6                                                                              |                                                                                   |                                                                                    | 20.1                                                                                | 20.1                                                                                |                                                                                     | 20.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.35                                                                                |                                                                                     | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 756                                                                               |                                                                                   |                                                                                   | 700                                                                               |                                                                                   |                                                                                    | 494                                                                                 | 533                                                                                 |                                                                                     | 503                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.27                                                                              |                                                                                   |                                                                                   | c0.40                                                                             |                                                                                   |                                                                                    | 0.12                                                                                | 0.01                                                                                |                                                                                     | c0.28                                                                               |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   | 0.90                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.04                                                                                |                                                                                     | 0.80                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 12.3                                                                              |                                                                                   |                                                                                   | 14.9                                                                              |                                                                                   |                                                                                    | 13.9                                                                                | 12.4                                                                                |                                                                                     | 17.0                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 1.5                                                                               |                                                                                   |                                                                                   | 14.4                                                                              |                                                                                   |                                                                                    | 1.9                                                                                 | 0.1                                                                                 |                                                                                     | 12.7                                                                                |                                                                                     |
| Delay (s)                         |                                                                                   | 13.7                                                                              |                                                                                   |                                                                                   | 29.3                                                                              |                                                                                   |                                                                                    | 15.8                                                                                | 12.5                                                                                |                                                                                     | 29.7                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.7                                                                              |                                                                                   |                                                                                   | 29.3                                                                              |                                                                                   |                                                                                    | 15.0                                                                                |                                                                                     |                                                                                     | 29.7                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 23.3                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 57.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 104.3%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | G                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 14: St. Paul St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |  |  |  |
| Traffic Volume (vph)              | 17                                                                                | 476                                                                               | 118                                                                               | 64                                                                                | 498                                                                               | 124                                                                               | 123                                                                                | 122                                                                                 | 75                                                                                  | 149                                                                                 | 145                                                                                 | 9                                                                                   |
| Future Volume (vph)               | 17                                                                                | 476                                                                               | 118                                                                               | 64                                                                                | 498                                                                               | 124                                                                               | 123                                                                                | 122                                                                                 | 75                                                                                  | 149                                                                                 | 145                                                                                 | 9                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1798                                                                              | 1531                                                                              | 1711                                                                              | 1747                                                                              |                                                                                   |                                                                                    | 1757                                                                                | 1531                                                                                | 1711                                                                                | 1785                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.95                                                                              | 1.00                                                                              | 0.36                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.76                                                                                | 1.00                                                                                | 0.61                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1715                                                                              | 1531                                                                              | 653                                                                               | 1747                                                                              |                                                                                   |                                                                                    | 1374                                                                                | 1531                                                                                | 1093                                                                                | 1785                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 17                                                                                | 476                                                                               | 118                                                                               | 64                                                                                | 498                                                                               | 124                                                                               | 123                                                                                | 122                                                                                 | 75                                                                                  | 149                                                                                 | 145                                                                                 | 9                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 64                                                                                | 0                                                                                 | 17                                                                                | 0                                                                                 | 0                                                                                  | 0                                                                                   | 48                                                                                  | 0                                                                                   | 3                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 493                                                                               | 54                                                                                | 64                                                                                | 605                                                                               | 0                                                                                 | 0                                                                                  | 245                                                                                 | 27                                                                                  | 149                                                                                 | 151                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 23.1                                                                              | 23.1                                                                              | 23.1                                                                              | 23.1                                                                              |                                                                                   |                                                                                    | 19.2                                                                                | 19.2                                                                                | 19.2                                                                                | 19.2                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 23.1                                                                              | 23.1                                                                              | 23.1                                                                              | 23.1                                                                              |                                                                                   |                                                                                    | 19.2                                                                                | 19.2                                                                                | 19.2                                                                                | 19.2                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.43                                                                              | 0.43                                                                              | 0.43                                                                              | 0.43                                                                              |                                                                                   |                                                                                    | 0.35                                                                                | 0.35                                                                                | 0.35                                                                                | 0.35                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 729                                                                               | 651                                                                               | 277                                                                               | 743                                                                               |                                                                                   |                                                                                    | 485                                                                                 | 541                                                                                 | 386                                                                                 | 631                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.35                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | 0.08                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.29                                                                              | 0.04                                                                              | 0.10                                                                              |                                                                                   |                                                                                   |                                                                                    | c0.18                                                                               | 0.02                                                                                | 0.14                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.68                                                                              | 0.08                                                                              | 0.23                                                                              | 0.81                                                                              |                                                                                   |                                                                                    | 0.51                                                                                | 0.05                                                                                | 0.39                                                                                | 0.24                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 12.6                                                                              | 9.3                                                                               | 9.9                                                                               | 13.7                                                                              |                                                                                   |                                                                                    | 13.8                                                                                | 11.5                                                                                | 13.1                                                                                | 12.4                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 2.5                                                                               | 0.1                                                                               | 0.4                                                                               | 6.9                                                                               |                                                                                   |                                                                                    | 3.7                                                                                 | 0.2                                                                                 | 2.9                                                                                 | 0.9                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 15.1                                                                              | 9.3                                                                               | 10.4                                                                              | 20.6                                                                              |                                                                                   |                                                                                    | 17.5                                                                                | 11.7                                                                                | 16.0                                                                                | 13.3                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 | A                                                                                 | B                                                                                 | C                                                                                 |                                                                                   |                                                                                    | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 14.0                                                                              |                                                                                   |                                                                                   | 19.6                                                                              |                                                                                   |                                                                                    | 16.2                                                                                |                                                                                     |                                                                                     | 14.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 16.5                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.67                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 54.3                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 89.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

15: Main St &amp; S Winooski Ave

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |  |                                                                                    |  |                                                                                     |  |  |  |
| Traffic Volume (vph)              | 97                                                                                | 608                                                                               | 57                                                                                | 92                                                                                | 647                                                                               | 174                                                                               | 7                                                                                  | 167                                                                                 | 49                                                                                  | 281                                                                                 | 450                                                                                 | 134                                                                                 |
| Future Volume (vph)               | 97                                                                                | 608                                                                               | 57                                                                                | 92                                                                                | 647                                                                               | 174                                                                               | 7                                                                                  | 167                                                                                 | 49                                                                                  | 281                                                                                 | 450                                                                                 | 134                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 0.97                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1625                                                                              | 1688                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1745                                                                                |                                                                                     | 1711                                                                                | 1801                                                                                | 1531                                                                                |
| Flt Permitted                     | 0.23                                                                              | 0.99                                                                              |                                                                                   | 0.18                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.98                                                                                |                                                                                     | 0.65                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 401                                                                               | 1670                                                                              |                                                                                   | 321                                                                               | 1801                                                                              | 1531                                                                              |                                                                                    | 1715                                                                                |                                                                                     | 1164                                                                                | 1801                                                                                | 1531                                                                                |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 97                                                                                | 608                                                                               | 57                                                                                | 92                                                                                | 647                                                                               | 174                                                                               | 7                                                                                  | 167                                                                                 | 49                                                                                  | 281                                                                                 | 450                                                                                 | 134                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 85                                                                                | 0                                                                                  | 17                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 89                                                                                  |
| Lane Group Flow (vph)             | 87                                                                                | 669                                                                               | 0                                                                                 | 92                                                                                | 647                                                                               | 89                                                                                | 0                                                                                  | 206                                                                                 | 0                                                                                   | 281                                                                                 | 450                                                                                 | 45                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | Perm                                                                              | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             | 26.0                                                                              | 26.0                                                                              |                                                                                   | 26.0                                                                              | 26.0                                                                              | 26.0                                                                              |                                                                                    | 19.1                                                                                |                                                                                     | 19.1                                                                                | 19.1                                                                                | 19.1                                                                                |
| Effective Green, g (s)            | 26.0                                                                              | 26.0                                                                              |                                                                                   | 26.0                                                                              | 26.0                                                                              | 26.0                                                                              |                                                                                    | 19.1                                                                                |                                                                                     | 19.1                                                                                | 19.1                                                                                | 19.1                                                                                |
| Actuated g/C Ratio                | 0.46                                                                              | 0.46                                                                              |                                                                                   | 0.46                                                                              | 0.46                                                                              | 0.46                                                                              |                                                                                    | 0.33                                                                                |                                                                                     | 0.33                                                                                | 0.33                                                                                | 0.33                                                                                |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 182                                                                               | 760                                                                               |                                                                                   | 146                                                                               | 820                                                                               | 697                                                                               |                                                                                    | 573                                                                                 |                                                                                     | 389                                                                                 | 602                                                                                 | 512                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.36                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.25                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.22                                                                              | c0.40                                                                             |                                                                                   | 0.29                                                                              |                                                                                   | 0.06                                                                              |                                                                                    | 0.12                                                                                |                                                                                     | 0.24                                                                                |                                                                                     | 0.03                                                                                |
| v/c Ratio                         | 0.48                                                                              | 0.88                                                                              |                                                                                   | 0.63                                                                              | 0.79                                                                              | 0.13                                                                              |                                                                                    | 0.36                                                                                |                                                                                     | 0.72                                                                                | 0.75                                                                                | 0.09                                                                                |
| Uniform Delay, d1                 | 10.8                                                                              | 14.1                                                                              |                                                                                   | 11.9                                                                              | 13.2                                                                              | 9.0                                                                               |                                                                                    | 14.4                                                                                |                                                                                     | 16.7                                                                                | 16.9                                                                                | 13.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 2.0                                                                               | 11.6                                                                              |                                                                                   | 8.6                                                                               | 5.1                                                                               | 0.1                                                                               |                                                                                    | 1.8                                                                                 |                                                                                     | 11.1                                                                                | 8.3                                                                                 | 0.3                                                                                 |
| Delay (s)                         | 12.8                                                                              | 25.7                                                                              |                                                                                   | 20.4                                                                              | 18.3                                                                              | 9.1                                                                               |                                                                                    | 16.1                                                                                |                                                                                     | 27.7                                                                                | 25.1                                                                                | 13.4                                                                                |
| Level of Service                  | B                                                                                 | C                                                                                 |                                                                                   | C                                                                                 | B                                                                                 | A                                                                                 |                                                                                    | B                                                                                   |                                                                                     | C                                                                                   | C                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 24.2                                                                              |                                                                                   |                                                                                   | 16.8                                                                              |                                                                                   |                                                                                    | 16.1                                                                                |                                                                                     |                                                                                     | 24.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 21.1                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.82                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 57.1                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 122.3%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 16: Main St &amp; S Union St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)              | 43                                                                                | 912                                                                               | 0                                                                                 | 0                                                                                 | 770                                                                               | 38                                                                                | 48                                                                                 | 368                                                                                 | 109                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (vph)               | 43                                                                                | 912                                                                               | 0                                                                                 | 0                                                                                 | 770                                                                               | 38                                                                                | 48                                                                                 | 368                                                                                 | 109                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1801                                                                              |                                                                                   |                                                                                   | 1789                                                                              |                                                                                   |                                                                                    | 1790                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted                     | 0.17                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 306                                                                               | 1801                                                                              |                                                                                   |                                                                                   | 1789                                                                              |                                                                                   |                                                                                    | 1790                                                                                | 1531                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 43                                                                                | 912                                                                               | 0                                                                                 | 0                                                                                 | 770                                                                               | 38                                                                                | 48                                                                                 | 368                                                                                 | 109                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 62                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 43                                                                                | 912                                                                               | 0                                                                                 | 0                                                                                 | 806                                                                               | 0                                                                                 | 0                                                                                  | 416                                                                                 | 47                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  | Perm                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 39.6                                                                              | 39.6                                                                              |                                                                                   |                                                                                   | 39.6                                                                              |                                                                                   |                                                                                    | 21.1                                                                                | 21.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Effective Green, g (s)            | 39.6                                                                              | 39.6                                                                              |                                                                                   |                                                                                   | 39.6                                                                              |                                                                                   |                                                                                    | 21.1                                                                                | 21.1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio                | 0.54                                                                              | 0.54                                                                              |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                    | 0.29                                                                                | 0.29                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane Grp Cap (vph)                | 166                                                                               | 981                                                                               |                                                                                   |                                                                                   | 974                                                                               |                                                                                   |                                                                                    | 519                                                                                 | 444                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.51                                                                             |                                                                                   |                                                                                   | 0.45                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.14                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 0.23                                                                                | 0.03                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.26                                                                              | 0.93                                                                              |                                                                                   |                                                                                   | 0.83                                                                              |                                                                                   |                                                                                    | 0.80                                                                                | 0.11                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Uniform Delay, d1                 | 8.8                                                                               | 15.3                                                                              |                                                                                   |                                                                                   | 13.7                                                                              |                                                                                   |                                                                                    | 23.9                                                                                | 18.9                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Incremental Delay, d2             | 0.8                                                                               | 14.5                                                                              |                                                                                   |                                                                                   | 5.9                                                                               |                                                                                   |                                                                                    | 12.3                                                                                | 0.5                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Delay (s)                         | 9.6                                                                               | 29.8                                                                              |                                                                                   |                                                                                   | 19.6                                                                              |                                                                                   |                                                                                    | 36.2                                                                                | 19.4                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | D                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                |                                                                                   | 28.9                                                                              |                                                                                   |                                                                                   | 19.6                                                                              |                                                                                   |                                                                                    | 32.7                                                                                |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 26.5                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 0.88                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 72.7                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 80.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

17: S Willard St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |  |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 32                                                                                | 886                                                                               | 37                                                                                | 69                                                                                | 798                                                                               | 66                                                                                | 32                                                                                 | 289                                                                                 | 40                                                                                  | 70                                                                                  | 214                                                                                 | 34                                                                                  |
| Future Volume (vph)               | 32                                                                                | 886                                                                               | 37                                                                                | 69                                                                                | 798                                                                               | 66                                                                                | 32                                                                                 | 289                                                                                 | 40                                                                                  | 70                                                                                  | 214                                                                                 | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 0.99                                                                              |                                                                                   | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1711                                                                              | 1790                                                                              |                                                                                   | 1711                                                                              | 1780                                                                              |                                                                                   |                                                                                    | 1766                                                                                |                                                                                     |                                                                                     | 1755                                                                                |                                                                                     |
| Flt Permitted                     | 0.13                                                                              | 1.00                                                                              |                                                                                   | 0.09                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.95                                                                                |                                                                                     |                                                                                     | 0.76                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 235                                                                               | 1790                                                                              |                                                                                   | 169                                                                               | 1780                                                                              |                                                                                   |                                                                                    | 1682                                                                                |                                                                                     |                                                                                     | 1345                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 32                                                                                | 886                                                                               | 37                                                                                | 69                                                                                | 798                                                                               | 66                                                                                | 32                                                                                 | 289                                                                                 | 40                                                                                  | 70                                                                                  | 214                                                                                 | 34                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  | 6                                                                                   | 0                                                                                   | 0                                                                                   | 6                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 32                                                                                | 921                                                                               | 0                                                                                 | 69                                                                                | 860                                                                               | 0                                                                                 | 0                                                                                  | 355                                                                                 | 0                                                                                   | 0                                                                                   | 312                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 42.7                                                                              | 42.7                                                                              |                                                                                   | 42.7                                                                              | 42.7                                                                              |                                                                                   |                                                                                    | 23.1                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Effective Green, g (s)            | 42.7                                                                              | 42.7                                                                              |                                                                                   | 42.7                                                                              | 42.7                                                                              |                                                                                   |                                                                                    | 23.1                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.55                                                                              | 0.55                                                                              |                                                                                   | 0.55                                                                              | 0.55                                                                              |                                                                                   |                                                                                    | 0.30                                                                                |                                                                                     |                                                                                     | 0.30                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 128                                                                               | 982                                                                               |                                                                                   | 92                                                                                | 976                                                                               |                                                                                   |                                                                                    | 499                                                                                 |                                                                                     |                                                                                     | 399                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.51                                                                             |                                                                                   |                                                                                   | 0.48                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    | 0.14                                                                              |                                                                                   |                                                                                   | 0.41                                                                              |                                                                                   |                                                                                   |                                                                                    | 0.21                                                                                |                                                                                     |                                                                                     | c0.23                                                                               |                                                                                     |
| v/c Ratio                         | 0.25                                                                              | 0.94                                                                              |                                                                                   | 0.75                                                                              | 0.88                                                                              |                                                                                   |                                                                                    | 0.71                                                                                |                                                                                     |                                                                                     | 0.78                                                                                |                                                                                     |
| Uniform Delay, d1                 | 9.2                                                                               | 16.3                                                                              |                                                                                   | 13.5                                                                              | 15.3                                                                              |                                                                                   |                                                                                    | 24.4                                                                                |                                                                                     |                                                                                     | 25.1                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 1.0                                                                               | 15.8                                                                              |                                                                                   | 28.6                                                                              | 9.4                                                                               |                                                                                   |                                                                                    | 8.4                                                                                 |                                                                                     |                                                                                     | 14.2                                                                                |                                                                                     |
| Delay (s)                         | 10.2                                                                              | 32.1                                                                              |                                                                                   | 42.0                                                                              | 24.7                                                                              |                                                                                   |                                                                                    | 32.8                                                                                |                                                                                     |                                                                                     | 39.3                                                                                |                                                                                     |
| Level of Service                  | B                                                                                 | C                                                                                 |                                                                                   | D                                                                                 | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 31.3                                                                              |                                                                                   |                                                                                   | 26.0                                                                              |                                                                                   |                                                                                    | 32.8                                                                                |                                                                                     |                                                                                     | 39.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 30.6                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.88                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 12.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 100.1%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Signalized Intersection Capacity Analysis

## 18: S Prospect St &amp; Main St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |  |  |                                                                                    |  |  |  |  |                                                                                     |
| Traffic Volume (vph)              | 0                                                                                 | 1426                                                                              | 1                                                                                 | 148                                                                               | 559                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 344                                                                                 | 392                                                                                 | 135                                                                                 | 17                                                                                  |
| Future Volume (vph)               | 0                                                                                 | 1426                                                                              | 1                                                                                 | 148                                                                               | 559                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 344                                                                                 | 392                                                                                 | 135                                                                                 | 17                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 0.95                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 0.97                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.98                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 3421                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1801                                                                                | 1531                                                                                | 3319                                                                                | 1770                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 3421                                                                              |                                                                                   | 1711                                                                              | 1801                                                                              | 1531                                                                              |                                                                                    | 1801                                                                                | 1531                                                                                | 3319                                                                                | 1770                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 1426                                                                              | 1                                                                                 | 148                                                                               | 559                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 344                                                                                 | 392                                                                                 | 135                                                                                 | 17                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 143                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 1427                                                                              | 0                                                                                 | 148                                                                               | 559                                                                               | 407                                                                               | 0                                                                                  | 151                                                                                 | 201                                                                                 | 392                                                                                 | 152                                                                                 | 0                                                                                   |
| Turn Type                         |                                                                                   | NA                                                                                |                                                                                   | Prot                                                                              | NA                                                                                | Prot                                                                              |                                                                                    | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                 | 8                                                                                 |                                                                                    | 2                                                                                   |                                                                                     | 1                                                                                   | 6                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 45.0                                                                              |                                                                                   | 10.0                                                                              | 61.0                                                                              | 61.0                                                                              |                                                                                    | 16.4                                                                                | 16.4                                                                                | 13.0                                                                                | 35.4                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 45.0                                                                              |                                                                                   | 10.0                                                                              | 61.0                                                                              | 61.0                                                                              |                                                                                    | 16.4                                                                                | 16.4                                                                                | 13.0                                                                                | 35.4                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.42                                                                              |                                                                                   | 0.09                                                                              | 0.56                                                                              | 0.56                                                                              |                                                                                    | 0.15                                                                                | 0.15                                                                                | 0.12                                                                                | 0.33                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                    | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 1420                                                                              |                                                                                   | 157                                                                               | 1013                                                                              | 861                                                                               |                                                                                    | 272                                                                                 | 231                                                                                 | 398                                                                                 | 578                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.42                                                                             |                                                                                   | c0.09                                                                             | 0.31                                                                              | 0.27                                                                              |                                                                                    | 0.08                                                                                |                                                                                     | c0.12                                                                               | 0.09                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | c0.13                                                                               |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 1.00                                                                              |                                                                                   | 0.94                                                                              | 0.55                                                                              | 0.47                                                                              |                                                                                    | 0.56                                                                                | 0.87                                                                                | 0.98                                                                                | 0.26                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 31.7                                                                              |                                                                                   | 48.9                                                                              | 15.0                                                                              | 14.1                                                                              |                                                                                    | 42.6                                                                                | 44.9                                                                                | 47.6                                                                                | 26.9                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 25.1                                                                              |                                                                                   | 54.7                                                                              | 2.2                                                                               | 1.9                                                                               |                                                                                    | 2.4                                                                                 | 27.3                                                                                | 40.8                                                                                | 0.2                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 56.8                                                                              |                                                                                   | 103.6                                                                             | 17.2                                                                              | 16.0                                                                              |                                                                                    | 45.1                                                                                | 72.2                                                                                | 88.4                                                                                | 27.1                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | E                                                                                 |                                                                                   | F                                                                                 | B                                                                                 | B                                                                                 |                                                                                    | D                                                                                   | E                                                                                   | F                                                                                   | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 56.8                                                                              |                                                                                   |                                                                                   | 28.2                                                                              |                                                                                   |                                                                                    | 63.9                                                                                |                                                                                     |                                                                                     | 71.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | E                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 51.1                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 108.4                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 86.9%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



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# Unsignalized Intersection Capacity Analysis

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)            | 75                                                                                | 54                                                                                | 30                                                                                | 70                                                                                | 2                                                                                 | 0                                                                                 |
| Future Volume (Veh/h)             | 75                                                                                | 54                                                                                | 30                                                                                | 70                                                                                | 2                                                                                 | 0                                                                                 |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 75                                                                                | 54                                                                                | 30                                                                                | 70                                                                                | 2                                                                                 | 0                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Median storage veh)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            |                                                                                   |                                                                                   | 129                                                                               |                                                                                   | 232                                                                               | 102                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 129                                                                               |                                                                                   | 232                                                                               | 102                                                                               |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   | 6.4                                                                               | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   | 3.5                                                                               | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 98                                                                                |                                                                                   | 100                                                                               | 100                                                                               |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1457                                                                              |                                                                                   | 741                                                                               | 953                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 129                                                                               | 100                                                                               | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 30                                                                                | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 54                                                                                | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1457                                                                              | 741                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.08                                                                              | 0.02                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 2                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 2.4                                                                               | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          |                                                                                   | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 2.4                                                                               | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 1.1                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 25.9%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 3: Pine St/Parking Garage &amp; Bank St

12/12/2016

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |
| Traffic Volume (veh/h)            | 47                                                                                | 13                                                                                | 41                                                                                | 45                                                                                | 0                                                                                 | 0                                                                                 |
| Future Volume (Veh/h)             | 47                                                                                | 13                                                                                | 41                                                                                | 45                                                                                | 0                                                                                 | 0                                                                                 |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 47                                                                                | 13                                                                                | 41                                                                                | 45                                                                                | 0                                                                                 | 0                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 64                                                                                | 64                                                                                |                                                                                   |                                                                                   | 86                                                                                |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 64                                                                                | 64                                                                                |                                                                                   |                                                                                   | 86                                                                                |                                                                                   |
| tC, single (s)                    | 6.4                                                                               | 6.2                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 95                                                                                | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |
| cM capacity (veh/h)               | 942                                                                               | 1001                                                                              |                                                                                   |                                                                                   | 1510                                                                              |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 60                                                                                | 86                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 47                                                                                | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 13                                                                                | 45                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 954                                                                               | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.06                                                                              | 0.05                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 5                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 9.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 9.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   | 3.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   | 15.0%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

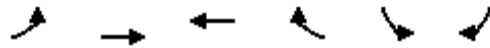


FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 4: Cherry St &amp; Pine St

12/12/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |      |  |      |
| Traffic Volume (veh/h)            | 25   | 121                                                                               | 97                                                                                | 36   | 46                                                                                | 75   |
| Future Volume (Veh/h)             | 25   | 121                                                                               | 97                                                                                | 36   | 46                                                                                | 75   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |      | 0%                                                                                |      |
| Peak Hour Factor                  | 1.00 | 1.00                                                                              | 1.00                                                                              | 1.00 | 1.00                                                                              | 1.00 |
| Hourly flow rate (vph)            | 25   | 121                                                                               | 97                                                                                | 36   | 46                                                                                | 75   |
| Pedestrians                       |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Upstream signal (ft)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC, conflicting volume            | 133  |                                                                                   |                                                                                   |      | 286                                                                               | 115  |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vCu, unblocked vol                | 133  |                                                                                   |                                                                                   |      | 286                                                                               | 115  |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 98   |                                                                                   |                                                                                   |      | 93                                                                                | 92   |
| cM capacity (veh/h)               | 1452 |                                                                                   |                                                                                   |      | 692                                                                               | 937  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |      |                                                                                   |      |
| Volume Total                      | 146  | 133                                                                               | 121                                                                               |      |                                                                                   |      |
| Volume Left                       | 25   | 0                                                                                 | 46                                                                                |      |                                                                                   |      |
| Volume Right                      | 0    | 36                                                                                | 75                                                                                |      |                                                                                   |      |
| cSH                               | 1452 | 1700                                                                              | 826                                                                               |      |                                                                                   |      |
| Volume to Capacity                | 0.02 | 0.08                                                                              | 0.15                                                                              |      |                                                                                   |      |
| Queue Length 95th (ft)            | 1    | 0                                                                                 | 13                                                                                |      |                                                                                   |      |
| Control Delay (s)                 | 1.4  | 0.0                                                                               | 10.1                                                                              |      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Approach Delay (s)                | 1.4  | 0.0                                                                               | 10.1                                                                              |      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Average Delay                     |      |                                                                                   | 3.6                                                                               |      |                                                                                   |      |
| Intersection Capacity Utilization |      |                                                                                   | 32.2%                                                                             |      | ICU Level of Service                                                              |      |
| Analysis Period (min)             |      |                                                                                   | 15                                                                                |      | A                                                                                 |      |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 23                                                                                | 128                                                                               | 46                                                                                | 23                                                                                | 159                                                                               | 20                                                                                | 88                                                                                 | 35                                                                                  | 16                                                                                  | 5                                                                                   | 25                                                                                  | 33                                                                                  |
| Future Volume (vph)               | 23                                                                                | 128                                                                               | 46                                                                                | 23                                                                                | 159                                                                               | 20                                                                                | 88                                                                                 | 35                                                                                  | 16                                                                                  | 5                                                                                   | 25                                                                                  | 33                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 23                                                                                | 128                                                                               | 46                                                                                | 23                                                                                | 159                                                                               | 20                                                                                | 88                                                                                 | 35                                                                                  | 16                                                                                  | 5                                                                                   | 25                                                                                  | 33                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 197                                                                               | 202                                                                               | 139                                                                               | 63                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 23                                                                                | 23                                                                                | 88                                                                                | 5                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 46                                                                                | 20                                                                                | 16                                                                                | 33                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.08                                                                             | 0.00                                                                              | 0.09                                                                              | -0.26                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.6                                                                               | 4.7                                                                               | 5.0                                                                               | 4.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.25                                                                              | 0.26                                                                              | 0.19                                                                              | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 736                                                                               | 730                                                                               | 662                                                                               | 674                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.1                                                                               | 9.3                                                                               | 9.2                                                                               | 8.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.1                                                                               | 9.3                                                                               | 9.2                                                                               | 8.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.1                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 35.5%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 26                                                                                | 102                                                                               | 22                                                                                | 16                                                                                | 154                                                                               | 50                                                                                | 58                                                                                 | 89                                                                                  | 18                                                                                  | 13                                                                                  | 15                                                                                  | 12                                                                                  |
| Future Volume (vph)               | 26                                                                                | 102                                                                               | 22                                                                                | 16                                                                                | 154                                                                               | 50                                                                                | 58                                                                                 | 89                                                                                  | 18                                                                                  | 13                                                                                  | 15                                                                                  | 12                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 26                                                                                | 102                                                                               | 22                                                                                | 16                                                                                | 154                                                                               | 50                                                                                | 58                                                                                 | 89                                                                                  | 18                                                                                  | 13                                                                                  | 15                                                                                  | 12                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 150                                                                               | 220                                                                               | 165                                                                               | 40                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 26                                                                                | 16                                                                                | 58                                                                                | 13                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 22                                                                                | 50                                                                                | 18                                                                                | 12                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.02                                                                             | -0.09                                                                             | 0.04                                                                              | -0.08                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.7                                                                               | 4.5                                                                               | 4.9                                                                               | 4.9                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.19                                                                              | 0.28                                                                              | 0.22                                                                              | 0.05                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 721                                                                               | 753                                                                               | 690                                                                               | 657                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 8.8                                                                               | 9.2                                                                               | 9.3                                                                               | 8.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 8.8                                                                               | 9.2                                                                               | 9.3                                                                               | 8.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.1                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 33.5%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |  |
| Traffic Volume (veh/h)            | 135                                                                               | 9                                                                                 | 14                                                                                | 182                                                                               | 96                                                                                | 63                                                                                |
| Future Volume (Veh/h)             | 135                                                                               | 9                                                                                 | 14                                                                                | 182                                                                               | 96                                                                                | 63                                                                                |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 135                                                                               | 9                                                                                 | 14                                                                                | 182                                                                               | 96                                                                                | 63                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |
| Median storage veh)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            |                                                                                   |                                                                                   | 144                                                                               |                                                                                   | 350                                                                               | 140                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 144                                                                               |                                                                                   | 350                                                                               | 140                                                                               |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   | 6.4                                                                               | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   | 3.5                                                                               | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 99                                                                                |                                                                                   | 85                                                                                | 93                                                                                |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1438                                                                              |                                                                                   | 641                                                                               | 909                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 144                                                                               | 196                                                                               | 159                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 14                                                                                | 96                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 9                                                                                 | 0                                                                                 | 63                                                                                |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1438                                                                              | 726                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.08                                                                              | 0.01                                                                              | 0.22                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 1                                                                                 | 21                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 0.6                                                                               | 11.3                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 0.6                                                                               | 11.3                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 3.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 37.0%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 3: Pine St/Parking Garage &amp; Bank St

12/12/2016

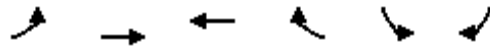
|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |
| Traffic Volume (veh/h)            | 61                                                                                | 9                                                                                 | 9                                                                                 | 53                                                                                | 0                                                                                 | 0                                                                                 |
| Future Volume (Veh/h)             | 61                                                                                | 9                                                                                 | 9                                                                                 | 53                                                                                | 0                                                                                 | 0                                                                                 |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 61                                                                                | 9                                                                                 | 9                                                                                 | 53                                                                                | 0                                                                                 | 0                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 36                                                                                | 36                                                                                |                                                                                   |                                                                                   | 62                                                                                |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 36                                                                                | 36                                                                                |                                                                                   |                                                                                   | 62                                                                                |                                                                                   |
| tC, single (s)                    | 6.4                                                                               | 6.2                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 94                                                                                | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |
| cM capacity (veh/h)               | 977                                                                               | 1037                                                                              |                                                                                   |                                                                                   | 1541                                                                              |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 70                                                                                | 62                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 61                                                                                | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 9                                                                                 | 53                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 985                                                                               | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.07                                                                              | 0.04                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 6                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 8.9                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 8.9                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   | 4.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   | 14.3%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 4: Cherry St &amp; Pine St

12/12/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |      |  |      |
| Traffic Volume (veh/h)            | 87   | 88                                                                                | 96                                                                                | 157  | 28                                                                                | 34   |
| Future Volume (Veh/h)             | 87   | 88                                                                                | 96                                                                                | 157  | 28                                                                                | 34   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |      | 0%                                                                                |      |
| Peak Hour Factor                  | 1.00 | 1.00                                                                              | 1.00                                                                              | 1.00 | 1.00                                                                              | 1.00 |
| Hourly flow rate (vph)            | 87   | 88                                                                                | 96                                                                                | 157  | 28                                                                                | 34   |
| Pedestrians                       |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Upstream signal (ft)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC, conflicting volume            | 253  |                                                                                   |                                                                                   |      | 436                                                                               | 174  |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vCu, unblocked vol                | 253  |                                                                                   |                                                                                   |      | 436                                                                               | 174  |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 93   |                                                                                   |                                                                                   |      | 95                                                                                | 96   |
| cM capacity (veh/h)               | 1312 |                                                                                   |                                                                                   |      | 539                                                                               | 869  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |      |                                                                                   |      |
| Volume Total                      | 175  | 253                                                                               | 62                                                                                |      |                                                                                   |      |
| Volume Left                       | 87   | 0                                                                                 | 28                                                                                |      |                                                                                   |      |
| Volume Right                      | 0    | 157                                                                               | 34                                                                                |      |                                                                                   |      |
| cSH                               | 1312 | 1700                                                                              | 681                                                                               |      |                                                                                   |      |
| Volume to Capacity                | 0.07 | 0.15                                                                              | 0.09                                                                              |      |                                                                                   |      |
| Queue Length 95th (ft)            | 5    | 0                                                                                 | 7                                                                                 |      |                                                                                   |      |
| Control Delay (s)                 | 4.2  | 0.0                                                                               | 10.8                                                                              |      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Approach Delay (s)                | 4.2  | 0.0                                                                               | 10.8                                                                              |      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Average Delay                     |      |                                                                                   | 2.9                                                                               |      |                                                                                   |      |
| Intersection Capacity Utilization |      |                                                                                   | 37.8%                                                                             |      | ICU Level of Service                                                              |      |
| Analysis Period (min)             |      |                                                                                   | 15                                                                                |      | A                                                                                 |      |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 26                                                                                | 144                                                                               | 106                                                                               | 37                                                                                | 122                                                                               | 13                                                                                | 35                                                                                 | 43                                                                                  | 23                                                                                  | 22                                                                                  | 71                                                                                  | 57                                                                                  |
| Future Volume (vph)               | 26                                                                                | 144                                                                               | 106                                                                               | 37                                                                                | 122                                                                               | 13                                                                                | 35                                                                                 | 43                                                                                  | 23                                                                                  | 22                                                                                  | 71                                                                                  | 57                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 26                                                                                | 144                                                                               | 106                                                                               | 37                                                                                | 122                                                                               | 13                                                                                | 35                                                                                 | 43                                                                                  | 23                                                                                  | 22                                                                                  | 71                                                                                  | 57                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 276                                                                               | 172                                                                               | 101                                                                               | 150                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 26                                                                                | 37                                                                                | 35                                                                                | 22                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 106                                                                               | 13                                                                                | 23                                                                                | 57                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.18                                                                             | 0.03                                                                              | -0.03                                                                             | -0.16                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.6                                                                               | 4.9                                                                               | 5.2                                                                               | 5.0                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.35                                                                              | 0.24                                                                              | 0.15                                                                              | 0.21                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 734                                                                               | 680                                                                               | 626                                                                               | 656                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 10.1                                                                              | 9.5                                                                               | 9.1                                                                               | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 10.1                                                                              | 9.5                                                                               | 9.1                                                                               | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.6                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 35.2%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 21                                                                                | 119                                                                               | 47                                                                                | 28                                                                                | 78                                                                                | 41                                                                                | 56                                                                                 | 85                                                                                  | 47                                                                                  | 38                                                                                  | 65                                                                                  | 37                                                                                  |
| Future Volume (vph)               | 21                                                                                | 119                                                                               | 47                                                                                | 28                                                                                | 78                                                                                | 41                                                                                | 56                                                                                 | 85                                                                                  | 47                                                                                  | 38                                                                                  | 65                                                                                  | 37                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 21                                                                                | 119                                                                               | 47                                                                                | 28                                                                                | 78                                                                                | 41                                                                                | 56                                                                                 | 85                                                                                  | 47                                                                                  | 38                                                                                  | 65                                                                                  | 37                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 187                                                                               | 147                                                                               | 188                                                                               | 140                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 21                                                                                | 28                                                                                | 56                                                                                | 38                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 47                                                                                | 41                                                                                | 47                                                                                | 37                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.09                                                                             | -0.10                                                                             | -0.06                                                                             | -0.07                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.8                                                                               | 4.9                                                                               | 4.9                                                                               | 4.9                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.25                                                                              | 0.20                                                                              | 0.25                                                                              | 0.19                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 688                                                                               | 675                                                                               | 688                                                                               | 669                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.5                                                                               | 9.1                                                                               | 9.5                                                                               | 9.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.5                                                                               | 9.1                                                                               | 9.5                                                                               | 9.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 34.2%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)            | 77                                                                                | 56                                                                                | 31                                                                                | 72                                                                                | 2                                                                                 | 0                                                                                 |
| Future Volume (Veh/h)             | 77                                                                                | 56                                                                                | 31                                                                                | 72                                                                                | 2                                                                                 | 0                                                                                 |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 77                                                                                | 56                                                                                | 31                                                                                | 72                                                                                | 2                                                                                 | 0                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            |                                                                                   |                                                                                   | 133                                                                               |                                                                                   | 239                                                                               | 105                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 133                                                                               |                                                                                   | 239                                                                               | 105                                                                               |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   | 6.4                                                                               | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   | 3.5                                                                               | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 98                                                                                |                                                                                   | 100                                                                               | 100                                                                               |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1452                                                                              |                                                                                   | 733                                                                               | 949                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 133                                                                               | 103                                                                               | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 31                                                                                | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 56                                                                                | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1452                                                                              | 733                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.08                                                                              | 0.02                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 2                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 2.4                                                                               | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          |                                                                                   | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 2.4                                                                               | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 1.1                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 26.3%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 3: Pine St/Parking Garage &amp; Bank St

12/12/2016

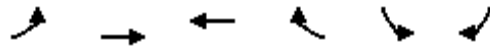
|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |
| Traffic Volume (veh/h)            | 48                                                                                | 13                                                                                | 42                                                                                | 46                                                                                | 0                                                                                 | 0                                                                                 |
| Future Volume (Veh/h)             | 48                                                                                | 13                                                                                | 42                                                                                | 46                                                                                | 0                                                                                 | 0                                                                                 |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 48                                                                                | 13                                                                                | 42                                                                                | 46                                                                                | 0                                                                                 | 0                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 65                                                                                | 65                                                                                |                                                                                   |                                                                                   | 88                                                                                |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 65                                                                                | 65                                                                                |                                                                                   |                                                                                   | 88                                                                                |                                                                                   |
| tC, single (s)                    | 6.4                                                                               | 6.2                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 95                                                                                | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |
| cM capacity (veh/h)               | 941                                                                               | 999                                                                               |                                                                                   |                                                                                   | 1508                                                                              |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 61                                                                                | 88                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 48                                                                                | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 13                                                                                | 46                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 952                                                                               | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.06                                                                              | 0.05                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 5                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 9.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 9.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   | 3.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   | 15.1%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 4: Cherry St &amp; Pine St

12/12/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |      |  |      |
| Traffic Volume (veh/h)            | 26   | 125                                                                               | 100                                                                               | 37   | 48                                                                                | 77   |
| Future Volume (Veh/h)             | 26   | 125                                                                               | 100                                                                               | 37   | 48                                                                                | 77   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |      | 0%                                                                                |      |
| Peak Hour Factor                  | 1.00 | 1.00                                                                              | 1.00                                                                              | 1.00 | 1.00                                                                              | 1.00 |
| Hourly flow rate (vph)            | 26   | 125                                                                               | 100                                                                               | 37   | 48                                                                                | 77   |
| Pedestrians                       |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Upstream signal (ft)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC, conflicting volume            | 137  |                                                                                   |                                                                                   |      | 296                                                                               | 118  |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vCu, unblocked vol                | 137  |                                                                                   |                                                                                   |      | 296                                                                               | 118  |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 98   |                                                                                   |                                                                                   |      | 93                                                                                | 92   |
| cM capacity (veh/h)               | 1447 |                                                                                   |                                                                                   |      | 683                                                                               | 933  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |      |                                                                                   |      |
| Volume Total                      | 151  | 137                                                                               | 125                                                                               |      |                                                                                   |      |
| Volume Left                       | 26   | 0                                                                                 | 48                                                                                |      |                                                                                   |      |
| Volume Right                      | 0    | 37                                                                                | 77                                                                                |      |                                                                                   |      |
| cSH                               | 1447 | 1700                                                                              | 818                                                                               |      |                                                                                   |      |
| Volume to Capacity                | 0.02 | 0.08                                                                              | 0.15                                                                              |      |                                                                                   |      |
| Queue Length 95th (ft)            | 1    | 0                                                                                 | 13                                                                                |      |                                                                                   |      |
| Control Delay (s)                 | 1.4  | 0.0                                                                               | 10.2                                                                              |      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Approach Delay (s)                | 1.4  | 0.0                                                                               | 10.2                                                                              |      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Average Delay                     |      |                                                                                   | 3.6                                                                               |      |                                                                                   |      |
| Intersection Capacity Utilization |      |                                                                                   | 32.9%                                                                             |      | ICU Level of Service                                                              |      |
| Analysis Period (min)             |      |                                                                                   | 15                                                                                |      | A                                                                                 |      |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 24                                                                                | 132                                                                               | 47                                                                                | 24                                                                                | 164                                                                               | 20                                                                                | 91                                                                                 | 36                                                                                  | 17                                                                                  | 6                                                                                   | 26                                                                                  | 34                                                                                  |
| Future Volume (vph)               | 24                                                                                | 132                                                                               | 47                                                                                | 24                                                                                | 164                                                                               | 20                                                                                | 91                                                                                 | 36                                                                                  | 17                                                                                  | 6                                                                                   | 26                                                                                  | 34                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 24                                                                                | 132                                                                               | 47                                                                                | 24                                                                                | 164                                                                               | 20                                                                                | 91                                                                                 | 36                                                                                  | 17                                                                                  | 6                                                                                   | 26                                                                                  | 34                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 203                                                                               | 208                                                                               | 144                                                                               | 66                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 24                                                                                | 24                                                                                | 91                                                                                | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 47                                                                                | 20                                                                                | 17                                                                                | 34                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.08                                                                             | 0.00                                                                              | 0.09                                                                              | -0.26                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.6                                                                               | 4.7                                                                               | 5.1                                                                               | 4.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.26                                                                              | 0.27                                                                              | 0.20                                                                              | 0.09                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 730                                                                               | 724                                                                               | 656                                                                               | 665                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.3                                                                               | 9.4                                                                               | 9.3                                                                               | 8.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.3                                                                               | 9.4                                                                               | 9.3                                                                               | 8.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 9.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 36.2%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 27                                                                                | 105                                                                               | 22                                                                                | 17                                                                                | 158                                                                               | 51                                                                                | 60                                                                                 | 91                                                                                  | 19                                                                                  | 13                                                                                  | 16                                                                                  | 12                                                                                  |
| Future Volume (vph)               | 27                                                                                | 105                                                                               | 22                                                                                | 17                                                                                | 158                                                                               | 51                                                                                | 60                                                                                 | 91                                                                                  | 19                                                                                  | 13                                                                                  | 16                                                                                  | 12                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 27                                                                                | 105                                                                               | 22                                                                                | 17                                                                                | 158                                                                               | 51                                                                                | 60                                                                                 | 91                                                                                  | 19                                                                                  | 13                                                                                  | 16                                                                                  | 12                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 154                                                                               | 226                                                                               | 170                                                                               | 41                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 27                                                                                | 17                                                                                | 60                                                                                | 13                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 22                                                                                | 51                                                                                | 19                                                                                | 12                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.02                                                                             | -0.09                                                                             | 0.04                                                                              | -0.08                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.7                                                                               | 4.5                                                                               | 4.9                                                                               | 5.0                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.20                                                                              | 0.29                                                                              | 0.23                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 715                                                                               | 749                                                                               | 686                                                                               | 650                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 8.9                                                                               | 9.4                                                                               | 9.4                                                                               | 8.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 8.9                                                                               | 9.4                                                                               | 9.4                                                                               | 8.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.2                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 34.4%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/09/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |  |
| Traffic Volume (veh/h)            | 139                                                                               | 9                                                                                 | 14                                                                                | 187                                                                               | 99                                                                                | 65                                                                                |
| Future Volume (Veh/h)             | 139                                                                               | 9                                                                                 | 14                                                                                | 187                                                                               | 99                                                                                | 65                                                                                |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 151                                                                               | 10                                                                                | 15                                                                                | 203                                                                               | 108                                                                               | 71                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            |                                                                                   |                                                                                   | 161                                                                               |                                                                                   | 389                                                                               | 156                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 161                                                                               |                                                                                   | 389                                                                               | 156                                                                               |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   | 6.4                                                                               | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   | 3.5                                                                               | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 99                                                                                |                                                                                   | 82                                                                                | 92                                                                                |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1418                                                                              |                                                                                   | 608                                                                               | 890                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 161                                                                               | 218                                                                               | 179                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 15                                                                                | 108                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 10                                                                                | 0                                                                                 | 71                                                                                |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1418                                                                              | 695                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.09                                                                              | 0.01                                                                              | 0.26                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 1                                                                                 | 26                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 0.6                                                                               | 12.0                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 0.6                                                                               | 12.0                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 37.5%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 3: Pine St/Parking Garage &amp; Bank St

12/09/2016

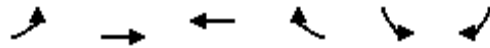
|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |
| Traffic Volume (veh/h)            | 63                                                                                | 9                                                                                 | 9                                                                                 | 55                                                                                | 0                                                                                 | 0                                                                                 |
| Future Volume (Veh/h)             | 63                                                                                | 9                                                                                 | 9                                                                                 | 55                                                                                | 0                                                                                 | 0                                                                                 |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 68                                                                                | 10                                                                                | 10                                                                                | 60                                                                                | 0                                                                                 | 0                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 40                                                                                | 40                                                                                |                                                                                   |                                                                                   | 70                                                                                |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 40                                                                                | 40                                                                                |                                                                                   |                                                                                   | 70                                                                                |                                                                                   |
| tC, single (s)                    | 6.4                                                                               | 6.2                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 93                                                                                | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |
| cM capacity (veh/h)               | 972                                                                               | 1031                                                                              |                                                                                   |                                                                                   | 1531                                                                              |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 78                                                                                | 70                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 68                                                                                | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 10                                                                                | 60                                                                                | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 979                                                                               | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.08                                                                              | 0.04                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 6                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 9.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 9.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   | 4.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   | 14.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 4: Cherry St &amp; Pine St

12/09/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR                  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |                      |  |      |
| Traffic Volume (veh/h)            | 89   | 90                                                                                | 99                                                                                | 161                  | 29                                                                                | 35   |
| Future Volume (Veh/h)             | 89   | 90                                                                                | 99                                                                                | 161                  | 29                                                                                | 35   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |                      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |                      | 0%                                                                                |      |
| Peak Hour Factor                  | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92                 | 0.92                                                                              | 0.92 |
| Hourly flow rate (vph)            | 97   | 98                                                                                | 108                                                                               | 175                  | 32                                                                                | 38   |
| Pedestrians                       |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |                      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Upstream signal (ft)              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vC, conflicting volume            | 283  |                                                                                   |                                                                                   |                      | 488                                                                               | 196  |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vCu, unblocked vol                | 283  |                                                                                   |                                                                                   |                      | 488                                                                               | 196  |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |                      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |                      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 92   |                                                                                   |                                                                                   |                      | 94                                                                                | 96   |
| cM capacity (veh/h)               | 1279 |                                                                                   |                                                                                   |                      | 498                                                                               | 846  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |                      |                                                                                   |      |
| Volume Total                      | 195  | 283                                                                               | 70                                                                                |                      |                                                                                   |      |
| Volume Left                       | 97   | 0                                                                                 | 32                                                                                |                      |                                                                                   |      |
| Volume Right                      | 0    | 175                                                                               | 38                                                                                |                      |                                                                                   |      |
| cSH                               | 1279 | 1700                                                                              | 641                                                                               |                      |                                                                                   |      |
| Volume to Capacity                | 0.08 | 0.17                                                                              | 0.11                                                                              |                      |                                                                                   |      |
| Queue Length 95th (ft)            | 6    | 0                                                                                 | 9                                                                                 |                      |                                                                                   |      |
| Control Delay (s)                 | 4.3  | 0.0                                                                               | 11.3                                                                              |                      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |                      |                                                                                   |      |
| Approach Delay (s)                | 4.3  | 0.0                                                                               | 11.3                                                                              |                      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |                      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Average Delay                     |      |                                                                                   | 3.0                                                                               |                      |                                                                                   |      |
| Intersection Capacity Utilization |      |                                                                                   | 38.5%                                                                             | ICU Level of Service |                                                                                   | A    |
| Analysis Period (min)             |      |                                                                                   | 15                                                                                |                      |                                                                                   |      |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/09/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 27                                                                                | 148                                                                               | 110                                                                               | 38                                                                                | 126                                                                               | 14                                                                                | 36                                                                                 | 44                                                                                  | 24                                                                                  | 23                                                                                  | 74                                                                                  | 59                                                                                  |
| Future Volume (vph)               | 27                                                                                | 148                                                                               | 110                                                                               | 38                                                                                | 126                                                                               | 14                                                                                | 36                                                                                 | 44                                                                                  | 24                                                                                  | 23                                                                                  | 74                                                                                  | 59                                                                                  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 29                                                                                | 161                                                                               | 120                                                                               | 41                                                                                | 137                                                                               | 15                                                                                | 39                                                                                 | 48                                                                                  | 26                                                                                  | 25                                                                                  | 80                                                                                  | 64                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 310                                                                               | 193                                                                               | 113                                                                               | 169                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 29                                                                                | 41                                                                                | 39                                                                                | 25                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 120                                                                               | 15                                                                                | 26                                                                                | 64                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.18                                                                             | 0.03                                                                              | -0.04                                                                             | -0.16                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.8                                                                               | 5.1                                                                               | 5.4                                                                               | 5.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.41                                                                              | 0.28                                                                              | 0.17                                                                              | 0.24                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 711                                                                               | 652                                                                               | 586                                                                               | 627                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 11.1                                                                              | 10.1                                                                              | 9.5                                                                               | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 11.1                                                                              | 10.1                                                                              | 9.5                                                                               | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | B                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 10.3                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 36.1%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/09/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 21                                                                                | 123                                                                               | 48                                                                                | 29                                                                                | 80                                                                                | 42                                                                                | 58                                                                                 | 88                                                                                  | 48                                                                                  | 39                                                                                  | 67                                                                                  | 38                                                                                  |
| Future Volume (vph)               | 21                                                                                | 123                                                                               | 48                                                                                | 29                                                                                | 80                                                                                | 42                                                                                | 58                                                                                 | 88                                                                                  | 48                                                                                  | 39                                                                                  | 67                                                                                  | 38                                                                                  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 23                                                                                | 134                                                                               | 52                                                                                | 32                                                                                | 87                                                                                | 46                                                                                | 63                                                                                 | 96                                                                                  | 52                                                                                  | 42                                                                                  | 73                                                                                  | 41                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 209                                                                               | 165                                                                               | 211                                                                               | 156                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 23                                                                                | 32                                                                                | 63                                                                                | 42                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 52                                                                                | 46                                                                                | 52                                                                                | 41                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.09                                                                             | -0.09                                                                             | -0.05                                                                             | -0.07                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 5.0                                                                               | 5.1                                                                               | 5.0                                                                               | 5.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.29                                                                              | 0.23                                                                              | 0.30                                                                              | 0.22                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 661                                                                               | 648                                                                               | 660                                                                               | 641                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 10.0                                                                              | 9.6                                                                               | 10.1                                                                              | 9.6                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 10.0                                                                              | 9.6                                                                               | 10.1                                                                              | 9.6                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | A                                                                                 | B                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.9                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 35.2%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

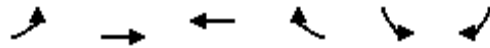
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)            | 75                                                                                | 114                                                                               | 60                                                                                | 70                                                                                | 44                                                                                | 5                                                                                 |
| Future Volume (Veh/h)             | 75                                                                                | 114                                                                               | 60                                                                                | 70                                                                                | 44                                                                                | 5                                                                                 |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 75                                                                                | 114                                                                               | 60                                                                                | 70                                                                                | 44                                                                                | 5                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              | 151                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   | 0.97                                                                              | 0.97                                                                              |
| vC, conflicting volume            |                                                                                   |                                                                                   | 189                                                                               |                                                                                   | 322                                                                               | 132                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 147                                                                               |                                                                                   | 284                                                                               | 88                                                                                |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   | 6.4                                                                               | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   | 3.5                                                                               | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 96                                                                                |                                                                                   | 93                                                                                | 99                                                                                |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1390                                                                              |                                                                                   | 655                                                                               | 940                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 189                                                                               | 130                                                                               | 49                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 60                                                                                | 44                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 114                                                                               | 0                                                                                 | 5                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1390                                                                              | 675                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.11                                                                              | 0.04                                                                              | 0.07                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 3                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 3.7                                                                               | 10.7                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 3.7                                                                               | 10.7                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 2.8                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 31.3%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 2: Bank St &amp; Parking Garage

12/12/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR                  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |                      |  |      |
| Traffic Volume (veh/h)            | 93   | 51                                                                                | 53                                                                                | 71                   | 36                                                                                | 21   |
| Future Volume (Veh/h)             | 93   | 51                                                                                | 53                                                                                | 71                   | 36                                                                                | 21   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |                      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |                      | 0%                                                                                |      |
| Peak Hour Factor                  | 1.00 | 1.00                                                                              | 1.00                                                                              | 1.00                 | 1.00                                                                              | 1.00 |
| Hourly flow rate (vph)            | 93   | 51                                                                                | 53                                                                                | 71                   | 36                                                                                | 21   |
| Pedestrians                       |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |                      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Upstream signal (ft)              |      | 157                                                                               |                                                                                   |                      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vC, conflicting volume            | 124  |                                                                                   |                                                                                   |                      | 326                                                                               | 88   |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vCu, unblocked vol                | 124  |                                                                                   |                                                                                   |                      | 326                                                                               | 88   |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |                      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |                      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 94   |                                                                                   |                                                                                   |                      | 94                                                                                | 98   |
| cM capacity (veh/h)               | 1463 |                                                                                   |                                                                                   |                      | 626                                                                               | 970  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |                      |                                                                                   |      |
| Volume Total                      | 144  | 124                                                                               | 57                                                                                |                      |                                                                                   |      |
| Volume Left                       | 93   | 0                                                                                 | 36                                                                                |                      |                                                                                   |      |
| Volume Right                      | 0    | 71                                                                                | 21                                                                                |                      |                                                                                   |      |
| cSH                               | 1463 | 1700                                                                              | 720                                                                               |                      |                                                                                   |      |
| Volume to Capacity                | 0.06 | 0.07                                                                              | 0.08                                                                              |                      |                                                                                   |      |
| Queue Length 95th (ft)            | 5    | 0                                                                                 | 6                                                                                 |                      |                                                                                   |      |
| Control Delay (s)                 | 5.1  | 0.0                                                                               | 10.4                                                                              |                      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |                      |                                                                                   |      |
| Approach Delay (s)                | 5.1  | 0.0                                                                               | 10.4                                                                              |                      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |                      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Average Delay                     |      | 4.1                                                                               |                                                                                   |                      |                                                                                   |      |
| Intersection Capacity Utilization |      | 28.3%                                                                             |                                                                                   | ICU Level of Service |                                                                                   | A    |
| Analysis Period (min)             |      | 15                                                                                |                                                                                   |                      |                                                                                   |      |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 23                                                                                | 128                                                                               | 46                                                                                | 23                                                                                | 159                                                                               | 22                                                                                | 86                                                                                 | 90                                                                                  | 16                                                                                  | 5                                                                                   | 60                                                                                  | 33                                                                                  |
| Future Volume (vph)               | 23                                                                                | 128                                                                               | 46                                                                                | 23                                                                                | 159                                                                               | 22                                                                                | 86                                                                                 | 90                                                                                  | 16                                                                                  | 5                                                                                   | 60                                                                                  | 33                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 23                                                                                | 128                                                                               | 46                                                                                | 23                                                                                | 159                                                                               | 22                                                                                | 86                                                                                 | 90                                                                                  | 16                                                                                  | 5                                                                                   | 60                                                                                  | 33                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 197                                                                               | 204                                                                               | 192                                                                               | 98                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 23                                                                                | 23                                                                                | 86                                                                                | 5                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 46                                                                                | 22                                                                                | 16                                                                                | 33                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.08                                                                             | -0.01                                                                             | 0.07                                                                              | -0.16                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.9                                                                               | 4.9                                                                               | 5.1                                                                               | 5.0                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.27                                                                              | 0.28                                                                              | 0.27                                                                              | 0.14                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 687                                                                               | 682                                                                               | 642                                                                               | 641                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.6                                                                               | 9.8                                                                               | 10.0                                                                              | 8.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.6                                                                               | 9.8                                                                               | 10.0                                                                              | 8.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | B                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 9.7                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 38.3%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 26                                                                                | 102                                                                               | 22                                                                                | 16                                                                                | 156                                                                               | 50                                                                                | 58                                                                                 | 147                                                                                 | 18                                                                                  | 13                                                                                  | 46                                                                                  | 12                                                                                  |
| Future Volume (vph)               | 26                                                                                | 102                                                                               | 22                                                                                | 16                                                                                | 156                                                                               | 50                                                                                | 58                                                                                 | 147                                                                                 | 18                                                                                  | 13                                                                                  | 46                                                                                  | 12                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 26                                                                                | 102                                                                               | 22                                                                                | 16                                                                                | 156                                                                               | 50                                                                                | 58                                                                                 | 147                                                                                 | 18                                                                                  | 13                                                                                  | 46                                                                                  | 12                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 150                                                                               | 222                                                                               | 223                                                                               | 71                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 26                                                                                | 16                                                                                | 58                                                                                | 13                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 22                                                                                | 50                                                                                | 18                                                                                | 12                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.02                                                                             | -0.09                                                                             | 0.04                                                                              | -0.03                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.9                                                                               | 4.8                                                                               | 5.0                                                                               | 5.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.21                                                                              | 0.30                                                                              | 0.31                                                                              | 0.10                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 670                                                                               | 704                                                                               | 680                                                                               | 631                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.2                                                                               | 9.8                                                                               | 10.2                                                                              | 8.7                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.2                                                                               | 9.8                                                                               | 10.2                                                                              | 8.7                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | B                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 39.9%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

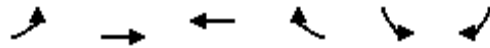
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)            | 135                                                                               | 81                                                                                | 50                                                                                | 182                                                                               | 220                                                                               | 79                                                                                |
| Future Volume (Veh/h)             | 135                                                                               | 81                                                                                | 50                                                                                | 182                                                                               | 220                                                                               | 79                                                                                |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 135                                                                               | 81                                                                                | 50                                                                                | 182                                                                               | 220                                                                               | 79                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |
| Median storage veh)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              | 151                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            |                                                                                   |                                                                                   | 216                                                                               | 458                                                                               |                                                                                   | 176                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 216                                                                               | 458                                                                               |                                                                                   | 176                                                                               |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               | 6.4                                                                               |                                                                                   | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               | 3.5                                                                               |                                                                                   | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 96                                                                                | 59                                                                                |                                                                                   | 91                                                                                |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1354                                                                              | 541                                                                               |                                                                                   | 868                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 216                                                                               | 232                                                                               | 299                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 50                                                                                | 220                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 81                                                                                | 0                                                                                 | 79                                                                                |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1354                                                                              | 600                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.13                                                                              | 0.04                                                                              | 0.50                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 3                                                                                 | 69                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 1.9                                                                               | 16.8                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 1.9                                                                               | 16.8                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 7.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.4%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 2: Bank St &amp; Parking Garage

12/12/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |      |  |      |
| Traffic Volume (veh/h)            | 71   | 60                                                                                | 69                                                                                | 78   | 109                                                                               | 62   |
| Future Volume (Veh/h)             | 71   | 60                                                                                | 69                                                                                | 78   | 109                                                                               | 62   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |      | 0%                                                                                |      |
| Peak Hour Factor                  | 1.00 | 1.00                                                                              | 1.00                                                                              | 1.00 | 1.00                                                                              | 1.00 |
| Hourly flow rate (vph)            | 71   | 60                                                                                | 69                                                                                | 78   | 109                                                                               | 62   |
| Pedestrians                       |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Upstream signal (ft)              |      | 157                                                                               |                                                                                   |      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC, conflicting volume            | 147  |                                                                                   |                                                                                   |      | 310                                                                               | 108  |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| vCu, unblocked vol                | 147  |                                                                                   |                                                                                   |      | 310                                                                               | 108  |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 95   |                                                                                   |                                                                                   |      | 83                                                                                | 93   |
| cM capacity (veh/h)               | 1435 |                                                                                   |                                                                                   |      | 649                                                                               | 946  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |      |                                                                                   |      |
| Volume Total                      | 131  | 147                                                                               | 171                                                                               |      |                                                                                   |      |
| Volume Left                       | 71   | 0                                                                                 | 109                                                                               |      |                                                                                   |      |
| Volume Right                      | 0    | 78                                                                                | 62                                                                                |      |                                                                                   |      |
| cSH                               | 1435 | 1700                                                                              | 732                                                                               |      |                                                                                   |      |
| Volume to Capacity                | 0.05 | 0.09                                                                              | 0.23                                                                              |      |                                                                                   |      |
| Queue Length 95th (ft)            | 4    | 0                                                                                 | 23                                                                                |      |                                                                                   |      |
| Control Delay (s)                 | 4.3  | 0.0                                                                               | 11.4                                                                              |      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Approach Delay (s)                | 4.3  | 0.0                                                                               | 11.4                                                                              |      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |      |                                                                                   |      |
| Average Delay                     |      | 5.6                                                                               |                                                                                   |      |                                                                                   |      |
| Intersection Capacity Utilization |      | 35.3%                                                                             | ICU Level of Service                                                              | A    |                                                                                   |      |
| Analysis Period (min)             |      | 15                                                                                |                                                                                   |      |                                                                                   |      |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 26                                                                                | 144                                                                               | 106                                                                               | 37                                                                                | 122                                                                               | 16                                                                                | 34                                                                                 | 106                                                                                 | 23                                                                                  | 22                                                                                  | 152                                                                                 | 57                                                                                  |
| Future Volume (vph)               | 26                                                                                | 144                                                                               | 106                                                                               | 37                                                                                | 122                                                                               | 16                                                                                | 34                                                                                 | 106                                                                                 | 23                                                                                  | 22                                                                                  | 152                                                                                 | 57                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 26                                                                                | 144                                                                               | 106                                                                               | 37                                                                                | 122                                                                               | 16                                                                                | 34                                                                                 | 106                                                                                 | 23                                                                                  | 22                                                                                  | 152                                                                                 | 57                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 276                                                                               | 175                                                                               | 163                                                                               | 231                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 26                                                                                | 37                                                                                | 34                                                                                | 22                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 106                                                                               | 16                                                                                | 23                                                                                | 57                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.18                                                                             | 0.02                                                                              | -0.01                                                                             | -0.10                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 5.1                                                                               | 5.5                                                                               | 5.5                                                                               | 5.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.39                                                                              | 0.27                                                                              | 0.25                                                                              | 0.34                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 655                                                                               | 601                                                                               | 585                                                                               | 623                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 11.4                                                                              | 10.4                                                                              | 10.3                                                                              | 11.0                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 11.4                                                                              | 10.4                                                                              | 10.3                                                                              | 11.0                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 10.9                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 40.0%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 21                                                                                | 119                                                                               | 47                                                                                | 28                                                                                | 80                                                                                | 41                                                                                | 56                                                                                 | 155                                                                                 | 47                                                                                  | 38                                                                                  | 157                                                                                 | 37                                                                                  |
| Future Volume (vph)               | 21                                                                                | 119                                                                               | 47                                                                                | 28                                                                                | 80                                                                                | 41                                                                                | 56                                                                                 | 155                                                                                 | 47                                                                                  | 38                                                                                  | 157                                                                                 | 37                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 21                                                                                | 119                                                                               | 47                                                                                | 28                                                                                | 80                                                                                | 41                                                                                | 56                                                                                 | 155                                                                                 | 47                                                                                  | 38                                                                                  | 157                                                                                 | 37                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 187                                                                               | 149                                                                               | 258                                                                               | 232                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 21                                                                                | 28                                                                                | 56                                                                                | 38                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 47                                                                                | 41                                                                                | 47                                                                                | 37                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.09                                                                             | -0.09                                                                             | -0.03                                                                             | -0.03                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 5.4                                                                               | 5.4                                                                               | 5.2                                                                               | 5.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.28                                                                              | 0.22                                                                              | 0.37                                                                              | 0.34                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 609                                                                               | 594                                                                               | 643                                                                               | 642                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 10.4                                                                              | 10.0                                                                              | 11.2                                                                              | 10.8                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 10.4                                                                              | 10.0                                                                              | 11.2                                                                              | 10.8                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 10.7                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 40.8%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

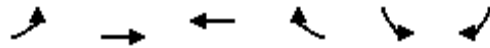
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)            | 77                                                                                | 116                                                                               | 61                                                                                | 72                                                                                | 44                                                                                | 5                                                                                 |
| Future Volume (Veh/h)             | 77                                                                                | 116                                                                               | 61                                                                                | 72                                                                                | 44                                                                                | 5                                                                                 |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 77                                                                                | 116                                                                               | 61                                                                                | 72                                                                                | 44                                                                                | 5                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              | 151                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   | 0.97                                                                              | 0.97                                                                              |
| vC, conflicting volume            |                                                                                   |                                                                                   | 193                                                                               |                                                                                   | 329                                                                               | 135                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 147                                                                               |                                                                                   | 288                                                                               | 87                                                                                |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   | 6.4                                                                               | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   | 3.5                                                                               | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 96                                                                                |                                                                                   | 93                                                                                | 99                                                                                |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1386                                                                              |                                                                                   | 649                                                                               | 938                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 193                                                                               | 133                                                                               | 49                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 61                                                                                | 44                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 116                                                                               | 0                                                                                 | 5                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1386                                                                              | 670                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.11                                                                              | 0.04                                                                              | 0.07                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 3                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 3.7                                                                               | 10.8                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 3.7                                                                               | 10.8                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 2.7                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 31.7%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 2: Bank St &amp; Parking Garage

12/12/2016



| Movement                          | EBL  | EBT                                                                               | WBT                                                                               | WBR                  | SBL                                                                               | SBR  |
|-----------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------|------|
| Lane Configurations               |      |  |  |                      |  |      |
| Traffic Volume (veh/h)            | 94   | 53                                                                                | 55                                                                                | 72                   | 36                                                                                | 21   |
| Future Volume (Veh/h)             | 94   | 53                                                                                | 55                                                                                | 72                   | 36                                                                                | 21   |
| Sign Control                      |      | Free                                                                              | Free                                                                              |                      | Stop                                                                              |      |
| Grade                             |      | 0%                                                                                | 0%                                                                                |                      | 0%                                                                                |      |
| Peak Hour Factor                  | 1.00 | 1.00                                                                              | 1.00                                                                              | 1.00                 | 1.00                                                                              | 1.00 |
| Hourly flow rate (vph)            | 94   | 53                                                                                | 55                                                                                | 72                   | 36                                                                                | 21   |
| Pedestrians                       |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Lane Width (ft)                   |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Walking Speed (ft/s)              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Percent Blockage                  |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Right turn flare (veh)            |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Median type                       |      | None                                                                              | None                                                                              |                      |                                                                                   |      |
| Median storage veh                |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Upstream signal (ft)              |      | 157                                                                               |                                                                                   |                      |                                                                                   |      |
| pX, platoon unblocked             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vC, conflicting volume            | 127  |                                                                                   |                                                                                   |                      | 332                                                                               | 91   |
| vC1, stage 1 conf vol             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vC2, stage 2 conf vol             |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| vCu, unblocked vol                | 127  |                                                                                   |                                                                                   |                      | 332                                                                               | 91   |
| tC, single (s)                    | 4.1  |                                                                                   |                                                                                   |                      | 6.4                                                                               | 6.2  |
| tC, 2 stage (s)                   |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| tF (s)                            | 2.2  |                                                                                   |                                                                                   |                      | 3.5                                                                               | 3.3  |
| p0 queue free %                   | 94   |                                                                                   |                                                                                   |                      | 94                                                                                | 98   |
| cM capacity (veh/h)               | 1459 |                                                                                   |                                                                                   |                      | 620                                                                               | 967  |
| Direction, Lane #                 | EB 1 | WB 1                                                                              | SB 1                                                                              |                      |                                                                                   |      |
| Volume Total                      | 147  | 127                                                                               | 57                                                                                |                      |                                                                                   |      |
| Volume Left                       | 94   | 0                                                                                 | 36                                                                                |                      |                                                                                   |      |
| Volume Right                      | 0    | 72                                                                                | 21                                                                                |                      |                                                                                   |      |
| cSH                               | 1459 | 1700                                                                              | 714                                                                               |                      |                                                                                   |      |
| Volume to Capacity                | 0.06 | 0.07                                                                              | 0.08                                                                              |                      |                                                                                   |      |
| Queue Length 95th (ft)            | 5    | 0                                                                                 | 6                                                                                 |                      |                                                                                   |      |
| Control Delay (s)                 | 5.1  | 0.0                                                                               | 10.5                                                                              |                      |                                                                                   |      |
| Lane LOS                          | A    |                                                                                   | B                                                                                 |                      |                                                                                   |      |
| Approach Delay (s)                | 5.1  | 0.0                                                                               | 10.5                                                                              |                      |                                                                                   |      |
| Approach LOS                      |      |                                                                                   | B                                                                                 |                      |                                                                                   |      |
| Intersection Summary              |      |                                                                                   |                                                                                   |                      |                                                                                   |      |
| Average Delay                     |      |                                                                                   | 4.1                                                                               |                      |                                                                                   |      |
| Intersection Capacity Utilization |      |                                                                                   | 28.6%                                                                             | ICU Level of Service |                                                                                   | A    |
| Analysis Period (min)             |      |                                                                                   | 15                                                                                |                      |                                                                                   |      |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 24                                                                                | 132                                                                               | 47                                                                                | 24                                                                                | 164                                                                               | 22                                                                                | 89                                                                                 | 91                                                                                  | 17                                                                                  | 6                                                                                   | 61                                                                                  | 34                                                                                  |
| Future Volume (vph)               | 24                                                                                | 132                                                                               | 47                                                                                | 24                                                                                | 164                                                                               | 22                                                                                | 89                                                                                 | 91                                                                                  | 17                                                                                  | 6                                                                                   | 61                                                                                  | 34                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 24                                                                                | 132                                                                               | 47                                                                                | 24                                                                                | 164                                                                               | 22                                                                                | 89                                                                                 | 91                                                                                  | 17                                                                                  | 6                                                                                   | 61                                                                                  | 34                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 203                                                                               | 210                                                                               | 197                                                                               | 101                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 24                                                                                | 24                                                                                | 89                                                                                | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 47                                                                                | 22                                                                                | 17                                                                                | 34                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.08                                                                             | -0.01                                                                             | 0.07                                                                              | -0.16                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 4.9                                                                               | 5.0                                                                               | 5.2                                                                               | 5.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.28                                                                              | 0.29                                                                              | 0.28                                                                              | 0.14                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 679                                                                               | 674                                                                               | 645                                                                               | 633                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.8                                                                               | 10.0                                                                              | 10.2                                                                              | 8.9                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.8                                                                               | 10.0                                                                              | 10.2                                                                              | 8.9                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | B                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 9.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 39.0%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 27                                                                                | 105                                                                               | 22                                                                                | 17                                                                                | 160                                                                               | 51                                                                                | 60                                                                                 | 150                                                                                 | 19                                                                                  | 13                                                                                  | 47                                                                                  | 12                                                                                  |
| Future Volume (vph)               | 27                                                                                | 105                                                                               | 22                                                                                | 17                                                                                | 160                                                                               | 51                                                                                | 60                                                                                 | 150                                                                                 | 19                                                                                  | 13                                                                                  | 47                                                                                  | 12                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 27                                                                                | 105                                                                               | 22                                                                                | 17                                                                                | 160                                                                               | 51                                                                                | 60                                                                                 | 150                                                                                 | 19                                                                                  | 13                                                                                  | 47                                                                                  | 12                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 154                                                                               | 228                                                                               | 229                                                                               | 72                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 27                                                                                | 17                                                                                | 60                                                                                | 13                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 22                                                                                | 51                                                                                | 19                                                                                | 12                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.02                                                                             | -0.09                                                                             | 0.04                                                                              | -0.03                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 5.0                                                                               | 4.8                                                                               | 5.0                                                                               | 5.2                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.21                                                                              | 0.31                                                                              | 0.32                                                                              | 0.10                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 664                                                                               | 699                                                                               | 675                                                                               | 624                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.3                                                                               | 9.9                                                                               | 10.3                                                                              | 8.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.3                                                                               | 9.9                                                                               | 10.3                                                                              | 8.8                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | A                                                                                 | A                                                                                 | B                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   | 9.8                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 40.7%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 1: Parking Garage &amp; Cherry St

12/12/2016

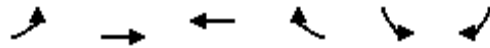
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |
| Movement                          | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | NBL                                                                               | NBR                                                                               |
| Lane Configurations               |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)            | 139                                                                               | 81                                                                                | 50                                                                                | 187                                                                               | 223                                                                               | 80                                                                                |
| Future Volume (Veh/h)             | 139                                                                               | 81                                                                                | 50                                                                                | 187                                                                               | 223                                                                               | 80                                                                                |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | Stop                                                                              |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                | 0%                                                                                |                                                                                   |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Hourly flow rate (vph)            | 139                                                                               | 81                                                                                | 50                                                                                | 187                                                                               | 223                                                                               | 80                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Median storage veh)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              | 151                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            |                                                                                   |                                                                                   | 220                                                                               | 466                                                                               |                                                                                   | 180                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                |                                                                                   |                                                                                   | 220                                                                               | 466                                                                               |                                                                                   | 180                                                                               |
| tC, single (s)                    |                                                                                   |                                                                                   | 4.1                                                                               | 6.4                                                                               |                                                                                   | 6.2                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            |                                                                                   |                                                                                   | 2.2                                                                               | 3.5                                                                               |                                                                                   | 3.3                                                                               |
| p0 queue free %                   |                                                                                   |                                                                                   | 96                                                                                | 58                                                                                |                                                                                   | 91                                                                                |
| cM capacity (veh/h)               |                                                                                   |                                                                                   | 1349                                                                              | 534                                                                               |                                                                                   | 863                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 220                                                                               | 237                                                                               | 303                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 0                                                                                 | 50                                                                                | 223                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 81                                                                                | 0                                                                                 | 80                                                                                |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1700                                                                              | 1349                                                                              | 594                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.13                                                                              | 0.04                                                                              | 0.51                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)            | 0                                                                                 | 3                                                                                 | 72                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.0                                                                               | 1.9                                                                               | 17.2                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.0                                                                               | 1.9                                                                               | 17.2                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 7.5                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 52.1%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 2: Bank St &amp; Parking Garage

12/12/2016



| Movement                          | EBL  | EBT   | WBT  | WBR                  | SBL  | SBR  |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations               |      | ↱     | ↰    |                      | ↘    |      |
| Traffic Volume (veh/h)            | 71   | 62    | 71   | 78                   | 109  | 62   |
| Future Volume (Veh/h)             | 71   | 62    | 71   | 78                   | 109  | 62   |
| Sign Control                      |      | Free  | Free |                      | Stop |      |
| Grade                             |      | 0%    | 0%   |                      | 0%   |      |
| Peak Hour Factor                  | 1.00 | 1.00  | 1.00 | 1.00                 | 1.00 | 1.00 |
| Hourly flow rate (vph)            | 71   | 62    | 71   | 78                   | 109  | 62   |
| Pedestrians                       |      |       |      |                      |      |      |
| Lane Width (ft)                   |      |       |      |                      |      |      |
| Walking Speed (ft/s)              |      |       |      |                      |      |      |
| Percent Blockage                  |      |       |      |                      |      |      |
| Right turn flare (veh)            |      |       |      |                      |      |      |
| Median type                       |      | None  | None |                      |      |      |
| Median storage (veh)              |      |       |      |                      |      |      |
| Upstream signal (ft)              |      | 157   |      |                      |      |      |
| pX, platoon unblocked             |      |       |      |                      |      |      |
| vC, conflicting volume            | 149  |       |      |                      | 314  | 110  |
| vC1, stage 1 conf vol             |      |       |      |                      |      |      |
| vC2, stage 2 conf vol             |      |       |      |                      |      |      |
| vCu, unblocked vol                | 149  |       |      |                      | 314  | 110  |
| tC, single (s)                    | 4.1  |       |      |                      | 6.4  | 6.2  |
| tC, 2 stage (s)                   |      |       |      |                      |      |      |
| tF (s)                            | 2.2  |       |      |                      | 3.5  | 3.3  |
| p0 queue free %                   | 95   |       |      |                      | 83   | 93   |
| cM capacity (veh/h)               | 1432 |       |      |                      | 645  | 943  |
| Direction, Lane #                 | EB 1 | WB 1  | SB 1 |                      |      |      |
| Volume Total                      | 133  | 149   | 171  |                      |      |      |
| Volume Left                       | 71   | 0     | 109  |                      |      |      |
| Volume Right                      | 0    | 78    | 62   |                      |      |      |
| cSH                               | 1432 | 1700  | 729  |                      |      |      |
| Volume to Capacity                | 0.05 | 0.09  | 0.23 |                      |      |      |
| Queue Length 95th (ft)            | 4    | 0     | 23   |                      |      |      |
| Control Delay (s)                 | 4.3  | 0.0   | 11.4 |                      |      |      |
| Lane LOS                          | A    |       | B    |                      |      |      |
| Approach Delay (s)                | 4.3  | 0.0   | 11.4 |                      |      |      |
| Approach LOS                      |      |       | B    |                      |      |      |
| Intersection Summary              |      |       |      |                      |      |      |
| Average Delay                     |      | 5.6   |      |                      |      |      |
| Intersection Capacity Utilization |      | 35.5% |      | ICU Level of Service |      | A    |
| Analysis Period (min)             |      | 15    |      |                      |      |      |



FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

## 11: College St &amp; Pine St

12/12/2016

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 27                                                                                | 148                                                                               | 110                                                                               | 38                                                                                | 126                                                                               | 16                                                                                | 35                                                                                 | 107                                                                                 | 24                                                                                  | 23                                                                                  | 154                                                                                 | 59                                                                                  |
| Future Volume (vph)               | 27                                                                                | 148                                                                               | 110                                                                               | 38                                                                                | 126                                                                               | 16                                                                                | 35                                                                                 | 107                                                                                 | 24                                                                                  | 23                                                                                  | 154                                                                                 | 59                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 27                                                                                | 148                                                                               | 110                                                                               | 38                                                                                | 126                                                                               | 16                                                                                | 35                                                                                 | 107                                                                                 | 24                                                                                  | 23                                                                                  | 154                                                                                 | 59                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 285                                                                               | 180                                                                               | 166                                                                               | 236                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 27                                                                                | 38                                                                                | 35                                                                                | 23                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 110                                                                               | 16                                                                                | 24                                                                                | 59                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.18                                                                             | 0.02                                                                              | -0.01                                                                             | -0.10                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 5.2                                                                               | 5.5                                                                               | 5.6                                                                               | 5.4                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.41                                                                              | 0.28                                                                              | 0.26                                                                              | 0.35                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 649                                                                               | 594                                                                               | 578                                                                               | 616                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 11.7                                                                              | 10.6                                                                              | 10.5                                                                              | 11.2                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 11.7                                                                              | 10.6                                                                              | 10.5                                                                              | 11.2                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 11.1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 40.8%                                                                             | ICU Level of Service                                                              |                                                                                   | A                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

FIGURE 5-A

## HCM Unsignalized Intersection Capacity Analysis

12: College St &amp; St. Paul St

12/12/2016

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Traffic Volume (vph)              | 21                                                                                | 123                                                                               | 48                                                                                | 29                                                                                | 83                                                                                | 42                                                                                | 58                                                                                 | 157                                                                                 | 48                                                                                  | 39                                                                                  | 159                                                                                 | 38                                                                                  |
| Future Volume (vph)               | 21                                                                                | 123                                                                               | 48                                                                                | 29                                                                                | 83                                                                                | 42                                                                                | 58                                                                                 | 157                                                                                 | 48                                                                                  | 39                                                                                  | 159                                                                                 | 38                                                                                  |
| Peak Hour Factor                  | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Hourly flow rate (vph)            | 21                                                                                | 123                                                                               | 48                                                                                | 29                                                                                | 83                                                                                | 42                                                                                | 58                                                                                 | 157                                                                                 | 48                                                                                  | 39                                                                                  | 159                                                                                 | 38                                                                                  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total (vph)                | 192                                                                               | 154                                                                               | 263                                                                               | 236                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left (vph)                 | 21                                                                                | 29                                                                                | 58                                                                                | 39                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right (vph)                | 48                                                                                | 42                                                                                | 48                                                                                | 38                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Hadj (s)                          | -0.09                                                                             | -0.09                                                                             | -0.03                                                                             | -0.03                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Departure Headway (s)             | 5.4                                                                               | 5.5                                                                               | 5.2                                                                               | 5.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Degree Utilization, x             | 0.29                                                                              | 0.23                                                                              | 0.38                                                                              | 0.34                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Capacity (veh/h)                  | 603                                                                               | 586                                                                               | 636                                                                               | 634                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 10.6                                                                              | 10.2                                                                              | 11.4                                                                              | 11.0                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 10.6                                                                              | 10.2                                                                              | 11.4                                                                              | 11.0                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Delay                             |                                                                                   |                                                                                   |                                                                                   | 10.9                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Level of Service                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 41.9%                                                                             | ICU Level of Service                                                              | A                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## Burlington Design Advisory Board

149 Church Street, City Hall Burlington, VT 05401  
<http://www.burlingtonvt.gov/PZ/Boards/Design-Advisory-Board/>  
Telephone: (802) 865-7188  
(802) 865-7195 (FAX)

*Matt Bushey, Chair  
Ron Wanamaker, Vice Chair  
Sean McKenzie  
Chris Alley  
Steve Offenhartz  
Jeremy Gates, Alternate  
Phil Hammerslough, Alternate*



### **Minutes Burlington Design Advisory Board Special Meeting, 3:00-5:00 pm. Tuesday, January 17, 2016 Conference Room 12, City Hall**

**Present:** Matt Bushey (Chair), Steve Offenhartz, Sean McKenzie, Ron Wanamaker

**Absent:** Chris Alley (resigned), Jeremy Gates (alternate), Phil Hammerslough (alternate).

**Staff present:** Mary O'Neil, David White

**1. 17-0662CA/MA; 75 CHERRY STREET (D, Ward 3C) PKSB Architects, PC / Devonwood Investors, LLC**

950,000 sf mixed use redevelopment of the existing Burlington Town Center mall site and associated lot line adjustments.

Applicant representatives present, including:

Don Sinex (Devonwood), Nicholas Principe (Devonwood), Jesse Beck (Freeman French Freeman), William Fellows (PKSB), Michael Willard (SE Group), Kevin Worden (Engineering Ventures), Kevin Morrissey and Art Klugo (PC Construction), Brian Dunkiel, David Saladino, Bill Neuberger (Holland), and Kirk Miller.

Others: Martha Lang, Joel Banner Baird (Burlington Free Press), Morgan True (VT Digger).

**Motion by Matthew Bushey** to table application for continued review on 1/24/2017.

**2<sup>nd</sup> – Ron Wanamaker**

**Vote 4-0.**

**Motion carries.**