

Burlington Development Review Board

149 Church Street, City Hall

Burlington, VT 05401

www.burlingtonvt.gov/pz/DRB

Telephone: (802) 865-7188

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Austin Hart
Brad Rabinowitz
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AJ LaRosa
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Alexandra Zipparo
Wayne Senville
Jim Drummond, (Alternate)
Robert Purvee, (Alternate)



BURLINGTON DEVELOPMENT REVIEW BOARD

Tuesday May 2, 2017, 5:00 PM

PUBLIC HEARING NOTICE

The Burlington Development Review Board will hold a meeting on
Tuesday May 2, 2017 at 5:00pm in Contois Auditorium, City Hall.

1. **17-0792CA/CU; 410 North Street (RL, Ward 1E) Scott Goodwin**
Add a 165 sq. ft. addition onto accessory dwelling unit. (Project Manager, Ryan Morrison)
2. **17-0825CA/MA; 85 North Ave (NMU, Ward 3C) Catamount/Lakeview, LLC**
Review of construction of a 43-unit residential building with associated parking and site improvements. (Project Manager, Scott Gustin)
3. **17-0896SD; 311 North Ave (RM-W, Ward 4N) BCCH**
Review of Final Plat for 9 lot subdivision (3 existing and 12 proposed lots).
(Project Manager, Scott Gustin)

Plans may be viewed in the Planning and Zoning Office, (City Hall, 149 Church Street, Burlington), between the hours of 8:00 a.m. and 4:30 p.m.

Participation in the DRB proceeding is a prerequisite to the right to take any subsequent appeal. Please note that ANYTHING submitted to the Planning and Zoning office is considered public and cannot be kept confidential.

This may not be the final order in which items will be heard. Please view final Agenda, at www.burlingtonvt.gov/pz/drbb/agendas or the office notice board, one week before the hearing for the order in which items will be heard.

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BURLINGTON DEVELOPMENT REVIEW BOARD Tuesday, May 2, 2017, 5:00 PM Contois Auditorium, City Hall, 149 Church St, Burlington, VT AGENDA

- I. Agenda**
- II. Communications**
- III. Minutes**
- IV. Consent**
 - 1. 17-0792CA/CU; 410 North Street (RL, Ward 1E) Scott Goodwin**
Add a 165 sq. ft. addition onto accessory dwelling unit. (Project Manager, Ryan Morrison)
 - 2. 17-0896SD; 311 North Ave (RM-W, Ward 4N) BCCH**
Review of Final Plat for 9 lot subdivision (3 existing and 12 proposed lots).
(Project Manager, Scott Gustin)
- V. Public Hearing**
 - 1. 17-0825CA/MA; 85 North Ave (NMU, Ward 3C) Catamount/Lakeview, LLC**
Review construction of a 43-unit residential building with associated parking and site improvements. (Project Manager, Scott Gustin)
 - 2. 17-0755CA/CU; 235 Penny Lane (DW-PT, Ward 3C) City of Burlington/Burlington Harbor Marina, LLC**
Continued review to construct marina, parking lot, and related site improvements.
(Project Manager, Scott Gustin)
- VI. Other Business**
- VII. Adjournment**

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Department of Planning and Zoning

149 Church Street
Burlington, VT 05401
<http://www.burlingtonvt.gov/PZ/>
Telephone: (802) 865-7188
(802) 865-7195 (FAX)

David E. White, AICP, Director
Meagan Tuttle, Comprehensive Planner
Jay Appleton, Senior GIS/IT Programmer/Analyst
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Ryan Morrison, CFM, Associate Planner
Anita Wade, Zoning Clerk



MEMORANDUM

To: Development Review Board
From: Ryan Morrison, CFM, Associate Planner
Date: May 2, 2017
RE: ZP17-0792CA; 410 North Street

Note: These are staff comments only. Decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

File: ZP17-0792CA
Location: 410 North Street
Zone: RL **Ward:** 1E
Date application accepted: February 16, 2017
Applicant/ Owner: Scott Goodwin / Scott Goodwin & Margaret Gayle Goodwin
Parking District: Neighborhood
Request: Construct an addition to the accessory dwelling unit.



Applicable Regulations:

Article 3 (Applications, Permits, and Project Reviews), Article 4 (Zoning Maps & Districts), Article 5 (Citywide General Regulations)

Background:

- **Non-Applicability of Zoning Permit Requirements 15-0683NA;** interior work only, no change in the number of residential units. December 2014.

- **Zoning Permit 16-1225CA/CU**; Finish garage interior to be accessory dwelling unit, add parking space. Approved January 31, 2017.

Overview:

The applicant proposes to construct a 165 sf addition onto the accessory dwelling unit in the detached garage. The 445 sf accessory dwelling unit was approved by the DRB on August 11, 2016. An appeal of the DRB decision was submitted on September 9, 2016. The appeal was heard by the Vermont Superior Court Environmental Division on January 17, 2017. On January 31, 2017, the Court affirmed the DRB's August 11, 2016 approval of ZP 16-1225CA/CU. The zoning permit was issued March 3, 2017.

Recommendation: **Consent approval**, as per, and subject to, the following findings and conditions:

I. Findings

Article 3: Applications, Permits and Project Reviews

Part 5: Conditional Use and Major Impact Review

Section 3.5.6 Review Criteria

(a) Conditional Use Review Standards

Approval shall be granted only if the DRB, after public notice and public hearing, determines that the proposed conditional use and associated development shall not result in an undue adverse effect on each of the following general standards:

1. *Existing or planned public utilities, facilities, or services are capable of supporting the proposed use in addition to the existing uses in the area;*

A letter of confirmation from DPW assuring adequate water and sewer capacity is a condition of approval for ZP 16-1225CA/CU. This requirement remains. **Affirmative finding as conditioned.**

2. *The character of the area affected as defined by the purpose or purposes of the zoning district(s) within which the project is located, and specifically stated policies and standards of the Municipal Development Plan;*

The property is within an established residential neighborhood and a residential zoning district. The RL zoning district is intended primarily for low-density residential development in the form of single detached dwellings and duplexes. This district is typically characterized by a compact and cohesive residential development pattern reflective of the respective neighborhoods' development history. The MDP provides the following support:

- *Support the development of additional housing opportunities within the city...* (MDP, Housing Plan, Page IX-1.
- *Support the creation of new rental and owner-occupied housing on every parcel of land in Burlington that is zoned for residential development at the number of units allowed by zoning.* (MDP, Housing Plan, Page IX-12.) **Affirmative finding.**

3. *The proposed use will not have nuisance impacts from noise, odor, dust, heat, and vibrations greater than typically generated by other permitted uses in the same zoning district;*

No greater impacts are anticipated than those other residential uses in the area.

Affirmative finding.

4. *The transportation system is capable of supporting the proposed use in addition to the existing uses in the area. Evaluation factors include street designations and capacity; level of service and other performance measures; access to arterial roadways; connectivity; transit availability; parking and access; impacts on pedestrian, bicycle and transit circulation, safety for all modes; and adequate transportation demand management strategies;*

The proposed addition should not result in additional traffic to the property. **Affirmative finding.**

5. *The utilization of renewable energy resources;*

Nothing within the application prevents the use of wind, solar, water, geothermal or other renewable energy resource. **Affirmative finding.**
and;

6. *Any standards or factors set forth in existing City bylaws and city and state ordinances. ZP 16-1225CA/CU requires the applicant to secure a state wastewater permit, and any associated trades permits for interior work. The current proposal will be subject to the conditions of ZP 16-1225CA/CU. Affirmative finding as conditioned.*

(c) Conditions of Approval

In addition to imposing conditions of approval necessary to satisfy the General Standards specified in (a) or (b) above, the DRB may also impose additional conditions of approval relative to any of the following:

1. *Mitigation measures, including but not limited to screening, landscaping, where necessary to reduce noise and glare and to maintain the property in a character in keeping with the surrounding area;*

Not applicable.

2. *Time limits for construction.*

There is a two-year time frame to complete the project.

3. *Hours of operation and/or construction to reduce the impact on surrounding properties. Typical construction hours in residential areas are Monday – Friday from 7:00 AM – 5:00 PM. Saturday construction may be allowed upon request. No work on Sunday.*

Affirmative finding as conditioned.

4. *That any future enlargement or alteration of the use return for review to the DRB to permit the specifying of new conditions,*

The applicant proposes constructing a 165 sf addition to the accessory dwelling unit approved under ZP 16-1225CA/CU. Condition #2 of ZP 16-1225CA/CU states “Any

*additional physical alteration or change of use to the accessory dwelling unit will require a new zoning permit, subject to the regulations in effect at the time of permit application submittal.” See Sec. 5.4.5 (b) (2) below. **Affirmative finding as conditioned.***

and

5. *Such additional reasonable performance standards, conditions and safeguards as it may deem necessary to implement the purposes of this chapter and the zoning regulations.*
None identified.

Article 4: Zoning Maps and Districts

Section 4.4.5 Residential Districts

(a) Purpose

1. The Residential Low Density (RL) district is intended primarily for low-density residential development in the form of single detached dwellings and duplexes. The district is typically characterized by a compact and cohesive residential development pattern reflective of the respective neighborhood’s development history.

An addition to the recently approved accessory dwelling unit is proposed. **Affirmative finding.**

(b) Dimensional Standards and Density

The density and intensity of development, dimensions of building lots, the heights of buildings and their setbacks from property boundary lines, and the limits on lot coverage shall be governed by the following standards:

Table 4.4.5-1 Minimum Lot Size and Frontage: RL, RL-W, RM and RM-W.

Single detached dwelling, RL Minimum 60’ frontage, RL Minimum 6,000 sq ft lot size.

410 North Street is a long, narrow, 10,950 sq ft lot, with approximately 27 feet of frontage. The property’s frontage is considered legally existing, non-conforming. **Affirmative finding.**

Table 4.4.5-2 Base Residential Density

Not applicable per Section 5.4.5 (a) below.

Table 4.4.5-3 Residential District Dimensional Standards

Maximum Lot Coverage – 35%.

Side Yard Setback – 10% of lot width or ave. side yard setback of 2 adjacent lots on both sides.

Rear Yard Setback – 25% of lot depth but in no event less than 20’. Max required 75’.

After the proposed addition is built, lot coverage will total 34%. The addition will maintain the existing west side yard setback of the existing garage – 5 feet. The lot is 330 feet deep, resulting in a maximum setback of 75 feet. The addition will be setback approximately 170 ft from the rear property line. **Affirmative finding.**

(c) Permitted and Conditional Uses

An accessory dwelling unit to a single family residential property is a permitted use; however, new construction triggers conditional use review. **Affirmative finding.**

(d) District Specific Regulations

1. Setbacks

A. Encroachment for residential driveways

Not applicable.

B. Encroachment into the Waterfront Setback

Not applicable.

2. Height

No change. Not applicable.

3. Lot Coverage

A. Exceptions for Accessory Residential Features

Not applicable.

4. Accessory Residential Structures and Uses

Not applicable.

5. Residential Density

A. Additional Unit to multi-family

Not applicable.

B. Additions to Existing Residential Structures

Not applicable.

C. Residential Occupancy Limits

Not applicable.

6. Uses

A. Exception for Existing Neighborhood Commercial Uses

Not applicable.

7. Residential Development Bonuses

No bonuses are sought. Not applicable.

Article 5: Citywide General Regulations

Section 5.4.5 Accessory Dwelling Units

(a) Accessory Units, General Standards/Permitted Uses

Where there is a primary structure on a lot which exists as an owner-occupied single family residence, one accessory dwelling unit, that is located within or appurtenant to such single family dwelling, shall be allowed as a permitted use if the provisions of this subsection are met. An accessory dwelling unit means an efficiency or one bedroom apartment that is clearly subordinate to the primary dwelling, and has facilities and provisions for independent living, including sleeping, food preparation, and sanitation. No accessory unit shall be inhabited by more than 2 adult occupants. An accessory unit shall not be counted as a dwelling unit for the purposes of density calculation.

Zoning Permit 16-1225CA/CU was approved on January 31, 2017 to convert 445 sf of garage space into an accessory dwelling unit. The applicant currently proposes to construct a 165 sf addition on the rear of the garage to increase the size of the accessory unit.

Additionally, there must be compliance with all the following:

1. *The property has sufficient wastewater capacity as certified by the Department of Public Works;*
The applicant is working to obtain a letter of adequate capacity from DPW for water and sewer services. **Affirmative finding as conditioned.**
2. *The unit does not consist of more than 30 percent of the total habitable floor area of the building, inclusive of the accessory dwelling unit;*
The applicant has submitted detailed floor plans of the primary structure, showing habitable floor area totaling 1,467 sf. The proposed addition will bring the accessory dwelling unit to 610 sf. When combined, habitable floor area will total 2,077 sf. $610/2,077 = 29.4\%$. **Affirmative finding.**
3. *Applicable setback and coverage requirements are met;*
See Table 4.4.5-3 (b) above. The addition will maintain the existing garage's 5 ft side yard setback – which exceeds the minimum setback requirement of 10% of the lot width. Lot coverage will total 34%. **Affirmative finding.**
4. *One additional parking space which may be legally allocated to the necessary unit must be provided for the accessory unit;*
The site plan shows a total of 3 parking spaces, 2 for the main residence, and 1 for the accessory dwelling unit. **Affirmative finding.**
and
5. *A deed or instrument for the property shall be entered into the land records by the owner containing a reference to the permit granting the accessory unit prior to the issuance of the certificate of occupancy for the unit. Such reference shall identify the permit number and note that the property is subject to the permit and its terms and conditions including owner occupancy. No certificate of occupancy shall be issued for the unit unless the owner has recorded such a notice.*
Condition #4 of ZP 16-1225CA/CU will ensure this. **Affirmative finding.**

(c) Discontinuance of Accessory Units

Approval of an accessory dwelling unit is contingent on owner occupancy of the single-family dwelling unit as a primary residence. For purposes of this section, owner occupancy means that, after the creation of the accessory unit all individuals listed on the deed for the property must reside in the primary unit or in the accessory unit. If either the primary unit or the accessory unit

is no longer owner occupied as a primary residence, the approval for the accessory dwelling unit is void and the kitchen of the accessory dwelling unit must be removed within 90 days with the entirety of the property being occupied as a single unit. When an accessory unit that is the result of additional square footage and/or a new accessory structure is proposed to be removed, revised floor plans and a revised site plan shall be required to be submitted for review and approval. Furthermore, where additional square footage is added to a single family home for purposes of creating an accessory unit and the accessory unit is at any point discontinued, none of the additional square footage shall be eligible for the purposes of increasing the number of unrelated adults that may be allowed to inhabit the property.

Condition #4 of ZP 16-1225CA/CU will ensure compliance with this section. **Affirmative finding.**

Section 5.5.1 Nuisance Regulations

Nothing within the application suggests non-compliance with applicable nuisance regulations and performance standards per the requirement of the Burlington Code of Ordinances.

Affirmative finding.

Section 5.5.2 Outdoor Lighting

A spotlight exists on the rear of the garage, above the entry door to the accessory dwelling unit. No new lighting is proposed under this application. Should the applicant wish to install new outdoor lighting, consultation with Planning and Zoning will be required to ensure compliance. **Affirmative finding as conditioned.**

Section 5.5.3 Stormwater and Erosion Control

Not applicable.

Section 5.5.4 Tree Removal

Not applicable.

II. Conditions of Approval

1. This permit is subject to the conditions of ZP 16-1225CA/CU.
2. **Prior to, or simultaneously with, issuance of a final Certificate of Occupancy,** a final Certificate of Occupancy shall be issued for ZP 16-1225CA/CU.
3. Any additional physical alteration or change of use to the accessory dwelling unit will require a new zoning permit, subject to regulations in effect at the time of permit application submittal.
4. Construction hours shall be limited to Monday – Friday from 7:00 AM – 5:00 PM. Saturday construction may be allowed upon request to the Development Review Board. No work on Sunday.
5. Should new outdoor lighting be proposed, the applicant shall submit a new zoning permit application to Planning & Zoning for review and approval subject to regulations in effect at the time of permit application submittal.
6. The applicant shall secure any associated trades permits for the interior work.
7. The applicant/property owner is responsible for obtaining all necessary Zoning Permits and Building Permits through the Department of Public Works as well as

other permit(s) as may be required, and shall meet all energy efficiency codes of the city and state as required

8. Standard Permit Conditions 1-15.



Department of Planning and Zoning

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Burlington, VT 05401-8415
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www.burlingtonvt.gov/pz

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FEB 16 2017

DEPARTMENT OF

Zoning Permit Application

Use this form for ALL zoning permit applications. See the relevant checklist for specific requirements.

PROJECT LOCATION ADDRESS: 410 North St.

PROPERTY

OWNER*: Scott Goodwin

*If condominium unit, written approval from the Association is also required

APPLICANT: Scott Goodwin

POSTAL ADDRESS: 410 North St.

POSTAL ADDRESS: 410 North St.

CITY, ST, ZIP: Burlington, VT, 05401

CITY, ST, ZIP: Burlington, VT, 05401

DAY PHONE: 802-922-6336

DAY PHONE: 802-922-6336

EMAIL: Sagoodwi@uvm.edu

EMAIL: Sagoodwi@uvm.edu

SIGNATURE:

Scott Goodwin
I am the owner. In addition, I duly authorize the applicant (if noted) to act on my behalf for all matters pertaining to this zoning permit application.

SIGNATURE:

Scott Goodwin

Description of Proposed Project: We would like to add a 165 square foot addition onto the accessory dwelling with 4 windows which will match the soon to be existing windows. As a result of the addition the interior layout will change but this will not cause any exterior changes.

Existing Use of Property: ☒ Single Family ☐ Multi Family: # Units ☐ Other:

Proposed Use of Property: ☒ Single Family ☐ Multi Family: # Units ☐ Other:

- **Does your project involve new construction, addition, alteration, renovation, or repair to a structure that is heated or cooled?** Yes ☒ No ☐
(If yes, the Vermont Residential Building Energy Standards (VRBES) apply. Visit the P&Z Office, Public Service Board or PSB website for details)
- **Will 400 sq ft or more of land be disturbed, exposed and/or developed?** Yes ☐ No ☒
(If yes, you will need to submit the 'Erosion Prevention and Sediment Control Plan' questionnaire, with a site plan)
- **For Single Family & Duplex, will total impervious area be 2500 sq ft or more?** Yes ☐ No ☒
(If yes, you will need to submit the 'Stormwater Management Plan' questionnaire, with a site plan)
- **Are you proposing any work within or above the public right of way?** Yes ☐ No ☒
(If yes, you will need to receive prior approval from the Department of Public Works)

Estimated Construction Cost (value)*: \$ 8,000

(*Estimated cost a typical contractor would charge for all materials and labor, regardless of who physically completes the work)

Within 30 days of submission, the permit application will be reviewed for completeness, and, if complete, will be processed administratively or referred to a board for review. All permit approvals or denials are subject to an appeal period (15 days for administrative permit; 30 days for board permit). A building (and/or electrical, mechanical, plumbing, curb cut) permit will also be required. Contact the Department of Public Works at 802-863-9094 to inquire. Please ask for assistance if you have any questions about filling out this form. Call the Planning and Zoning at 802-865-7188, or visit the office in the lower level of City Hall, 149 Church Street.

Office Use Only: Zone: RL Eligible for Design Review? Y Age of House 1890 Lot Size 10950
Type: SN AW FC BA COA 1 ✓ COA 2 COA 3 CU MA VR HO SP DT MP
Check No. 1005 Amount Paid \$ 80. Zoning Permit # 17-0792 CA



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DEPARTMENT OF
PLANNING & ZONING

LOWE'S PROJECT SERVICES CAN HELP WITH INSTALLATIONS, REMODELS AND MORE. GET STARTED >



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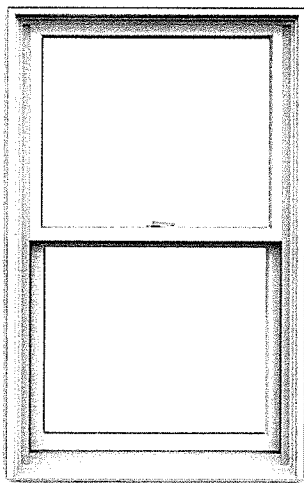
Prices, promotions, styles, and availability may vary. Our local stores do not honor online pricing. Prices and availability of products and services are subject to change without notice. Errors will be corrected where discovered, and Lowe's reserves the right to revoke any stated offer and to correct any errors, inaccuracies or omissions including after an order has been submitted.

- ETCM -
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JELD-WEN Tradition Aluminum-Clad Double Pane Annealed Double Hung Window (Rough Opening: 30.125-in x 40.75-in; Actual: 29.375-in x 40-in)

Item # 71810 Model #
LOWOLTDHCW2940LE

☆☆☆☆ No
reviews



\$245.58

-	1	+
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delivery on
04/20/2017 at
South Burlington



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\$299 Minimum |

et Details

Description

- Tradition aluminum-clad wood double hung windows are built from Auralast wood - pine for superior protection against decay and termites, backed by our industry-leading 20-year warranty
- Durable brilliant white metal cladding surrounds the exterior wood of our windows for steadfast protection from the elements
- Low-E 366 insulating glass lowers energy costs and helps homes stay cooler in the summer and warmer in the winter
- Natural unfinished wood interior can be painted or stained to match your decor
- Both sashes tilt in for convenient cleaning

Planning

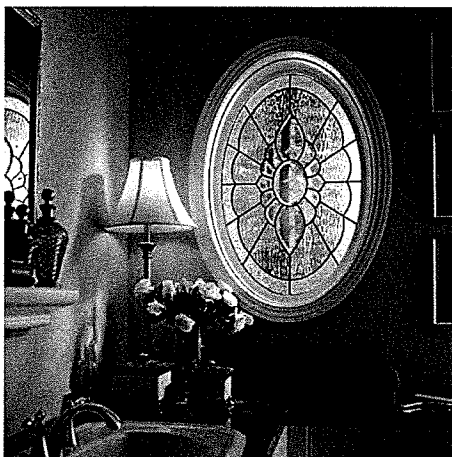
Burlington, Vermont

Specifications

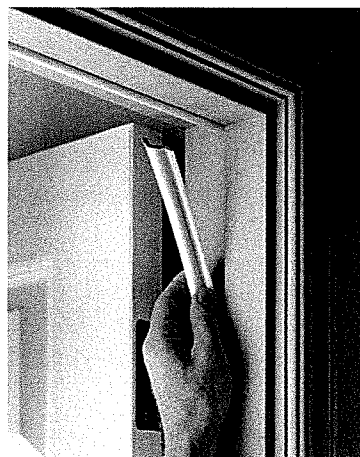
Actual Height (Inches)	40	Lock Type	Cam
Actual Width (Inches)	29.375	Nail Fin	Integrated
Jamb Depth (Inches)	4.5625	J Channel	N/A
Series	Tradition	Mulling	Field applied
Interior Color/Finish	Auralast wood natural	Wood Jamb Extension	4-9/16-in
Exterior Color/Finish	Brilliant white	Number of Locks	1
Hardware Color/Finish	Desert sand	Ventilation Latches	N/A
Paintable	Yes	Tilt Mechanism	Compression
Color/Finish Family	White	High Altitude Rated	X
Frame Material	Aluminum-clad	Hurricane Approved	X
Grid Type	N/A	Miami Dade Approved	X
Grid Width	N/A	Sound Transmission Control (STC) Rated	✓
Grid Profile	N/A	Florida Product Approved	X
Grid Pattern	N/A	Design Pressure (DP) Rating	35
Argon Gas Insulated	✓		
Glass Strength	Annealed		

Obscure Glass	×	Texas Department of Insurance Approved	×
Frame Profile	Flat	U Value	0.31
Screen Included	Full	Meets CA Forced Entry Requirements	×
Screen Type	Fiberglass mesh	Solar Heat Gain Coefficient (SHGC)	0.22
Screen Frame Type	Extruded	Works with Iris	×
Balance System	Constant force	Grid Included	×
Tilting	✓	ENERGY STAR Certified Northern Zone	×
Warranty	20-year	ENERGY STAR Certified North/Central Zone	×
Lowe's Exclusive	×	ENERGY STAR Certified South/Central Zone	×
Project Type	New construction	ENERGY STAR Certified Southern Zone	✓
Meets Egress Requirement	×	Rough Opening Width (Inches)	30.125
		Rough Opening Height (Inches)	40.75
		Glazing Type	Double pane

Projects, Tips & Services



Window Installation



Weather Strip Your Windows

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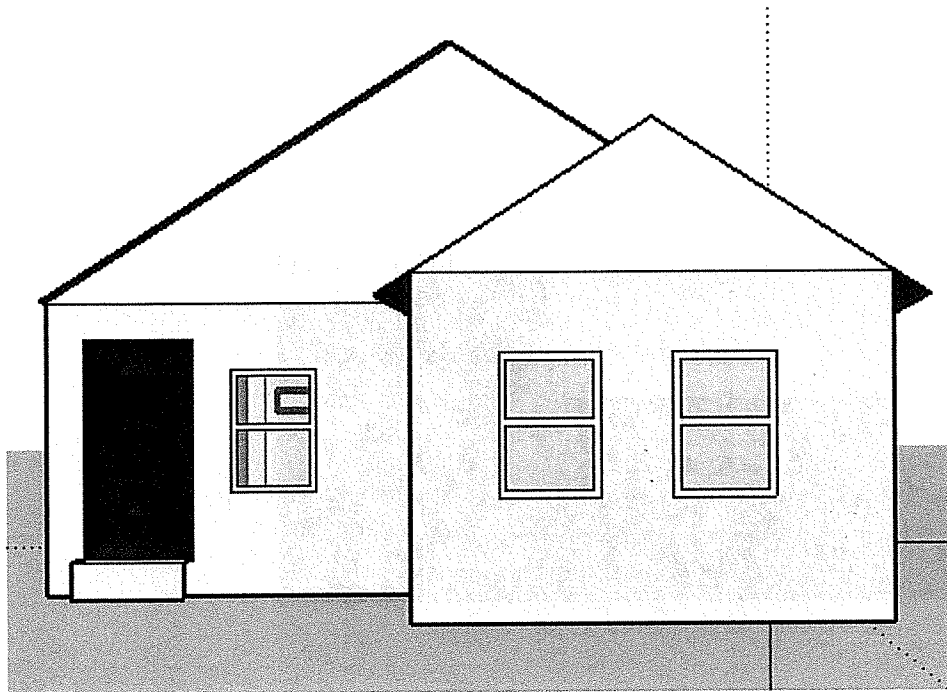
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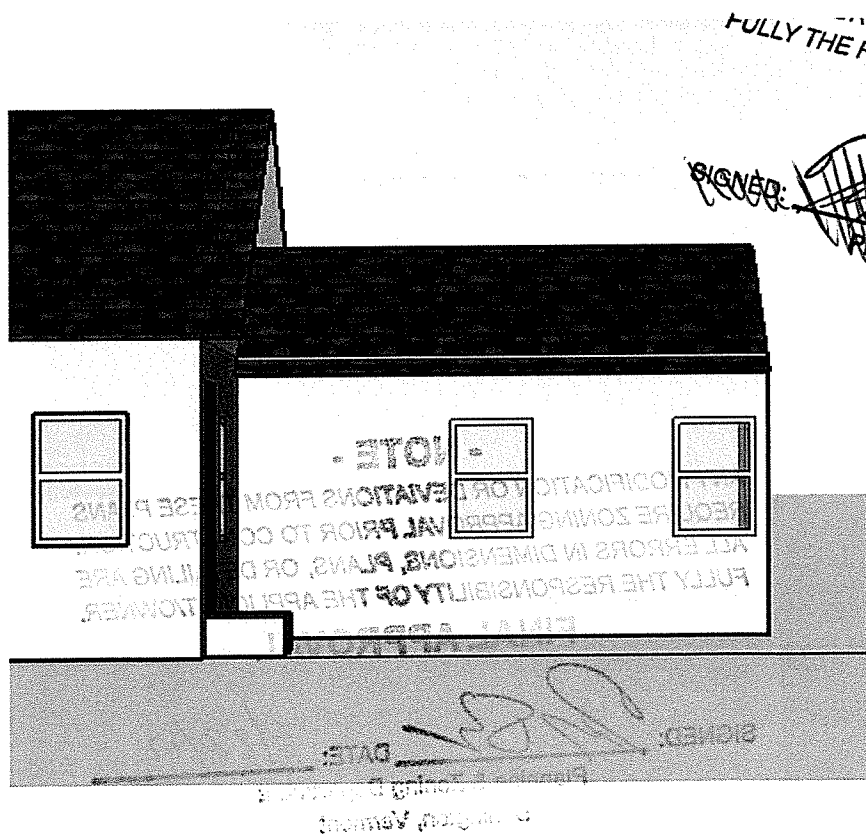
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North Elevation



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DEPARTMENT
PLANNING & ZONING

East Elevation



West Elevation

- NOTE -
ANY MODIFICATION OR DEVIATIONS FROM THESE PLANS
MUST BE APPROVED PRIOR TO CONSTRUCTION.
ALL ERRORS IN DIMENSIONS, PLANS, OR DETAILS WILL BE
FULLY THE RESPONSIBILITY OF THE APPLICANT/OWNER.

FINAL APPROVAL

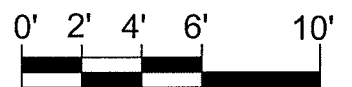
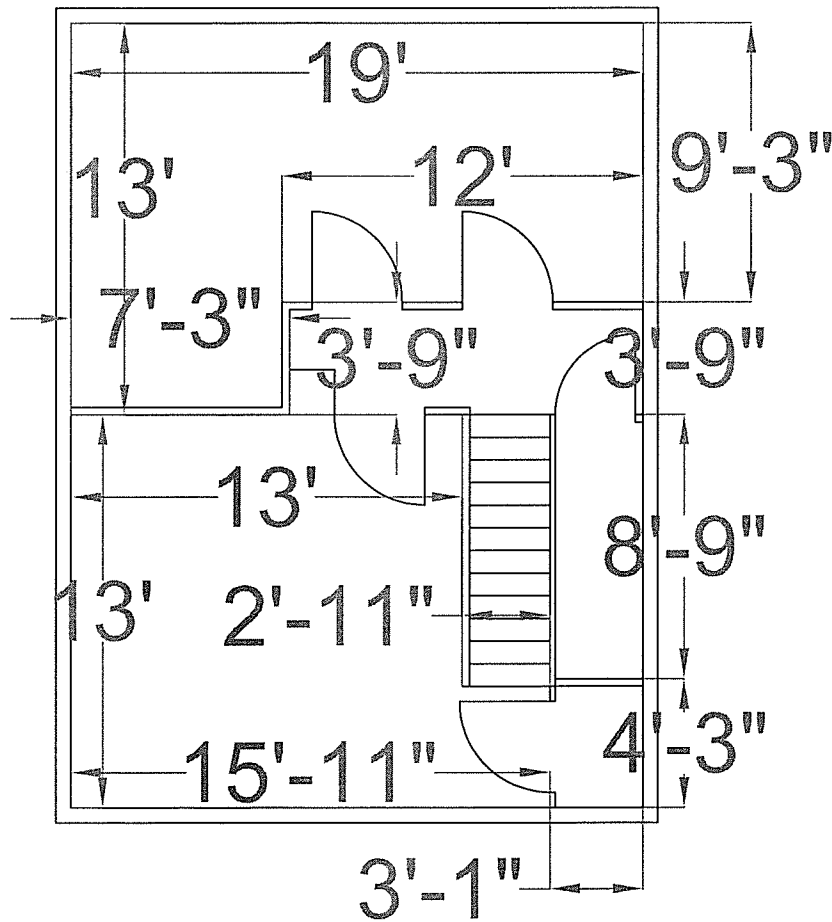
Burlington Vermont
Planning & Zoning Department
DATE: 8/27/2020

	410 North Street Floor Plans
	Scott Goodwin (Owner) 802-922-6336 410 North St. Burlington, VT 05401
First Floor • Living Room = 180 sf • Kitchen = 270 sf • Bathroom = 76.5 sf • Bedroom 1 = 175.5 sf • Hallway 1 = 78 sf • Dinning Room = 165.75 sf • Vestibule = 24 sf • Total = 969.75 sf	Permit Set Revised 3/14/17
Second Floor • Hallway = 45 sf • Bedroom 2 = 205.25 sf • Bedroom 3 = 194.5 sf • Stairs and Closet = 52.5 sf • Total= 497.25 sf	
House Total= 1467 sf	Room Area Chart
	A-3
	Date: 3/14/17 Scale: 1/4"=1'

410 North Street
Floor Plans

Scott Goodwin (Owner)
802-922-6336
410 North St.
Burlington, VT 05401

Permit Set
Revised 3/14/17

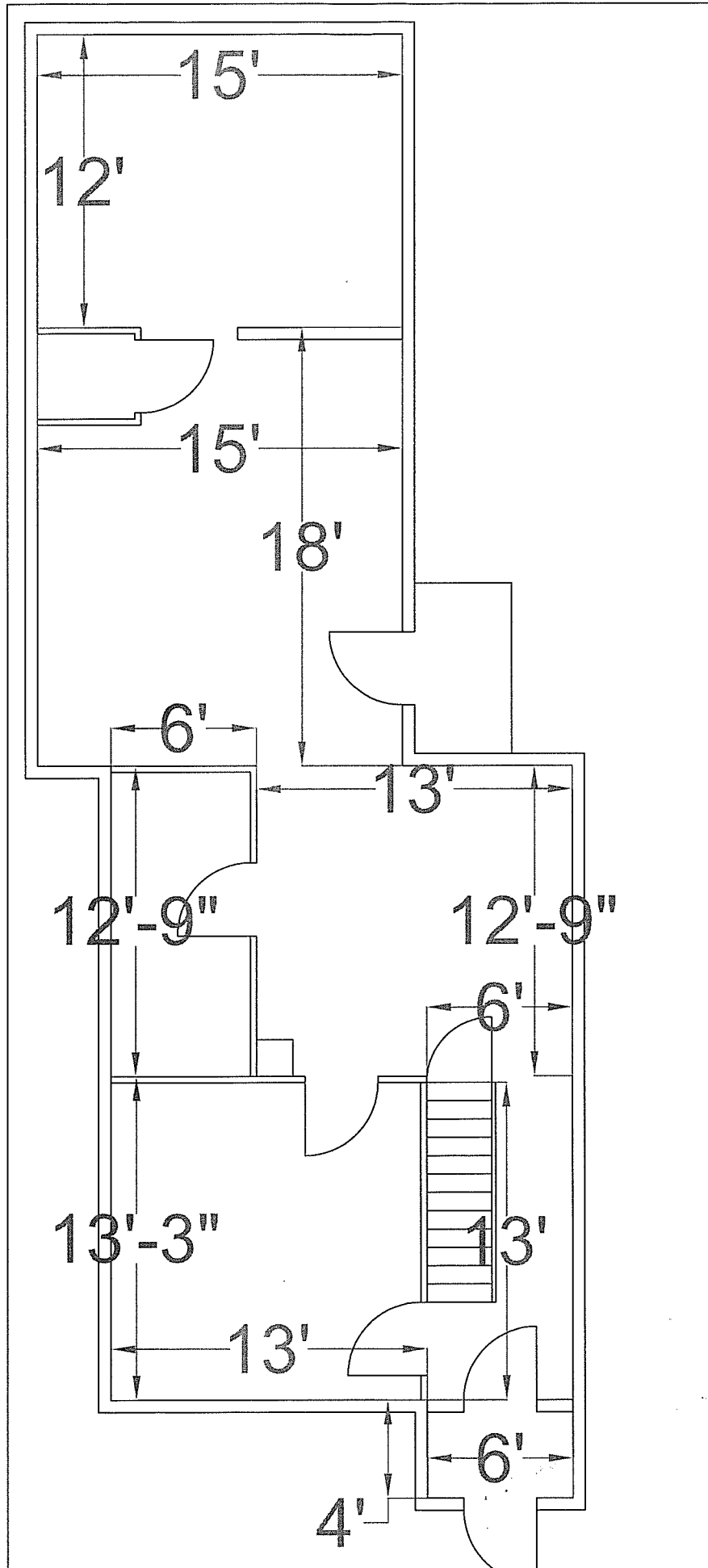


Architectural
Plan Floor 2

A-2

Date:
3/14/17

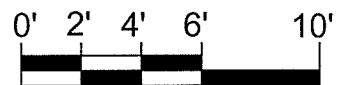
Scale:
1/4"=1'



410 North Street
Floor Plans

Scott Goodwin (Owner)
802-922-6336
410 North St.
Burlington, VT 05401

Permit Set
Revised 3/14/17



Architectural
Plan Floor 2

A-2

Date:
3/14/17

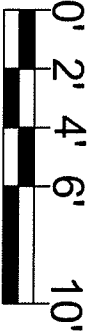
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410 North Street
Garage Addition
Renovations

Scott Goodwin (Owner)
802-922-6336
410 North St.
Burlington, VT 05401

Permit Set
Revised 2/10/17

RECEIVED
FEB 16 2017
DEPARTMENT OF
PLANNING & ZONING

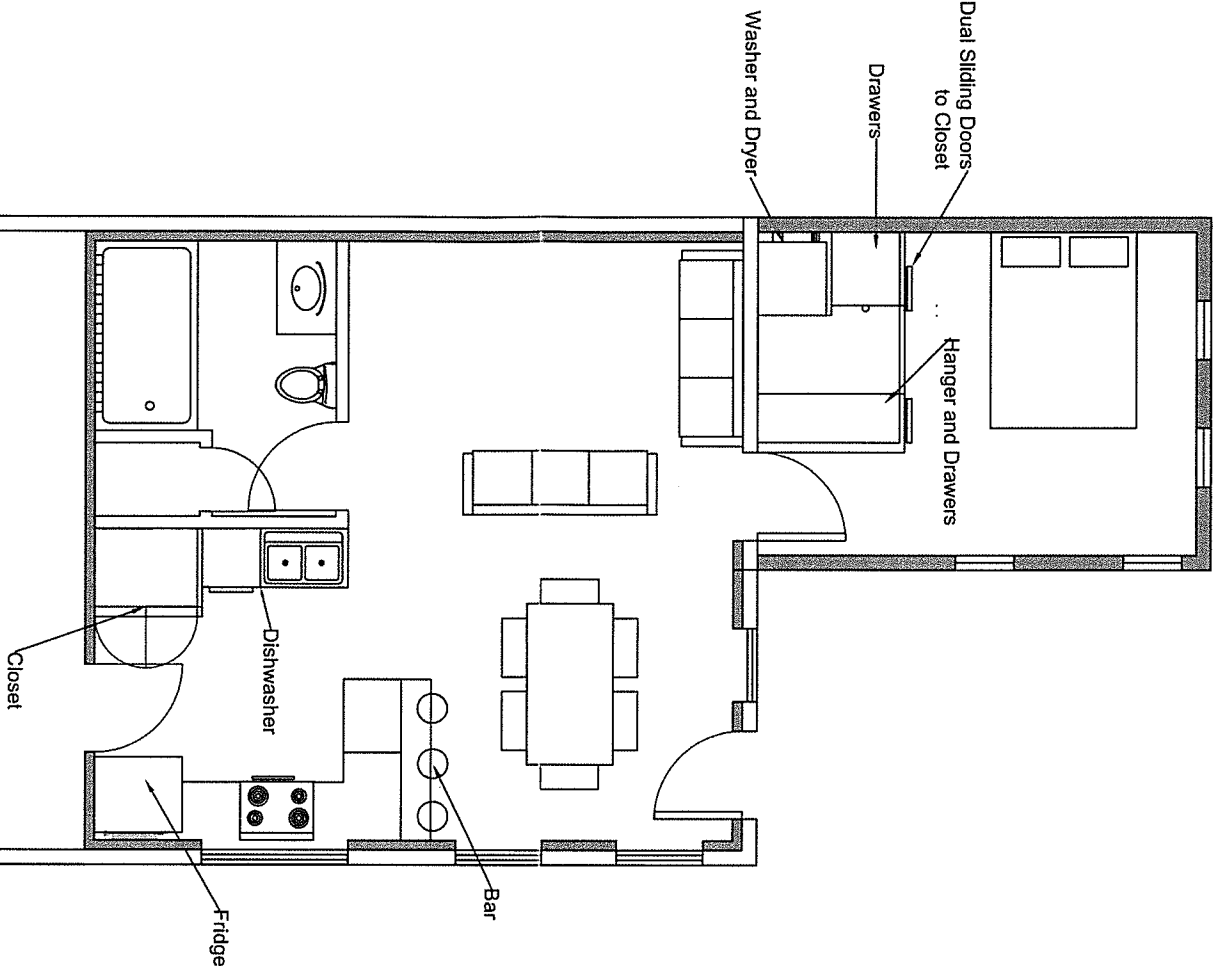


Architectural
Plan

A-1

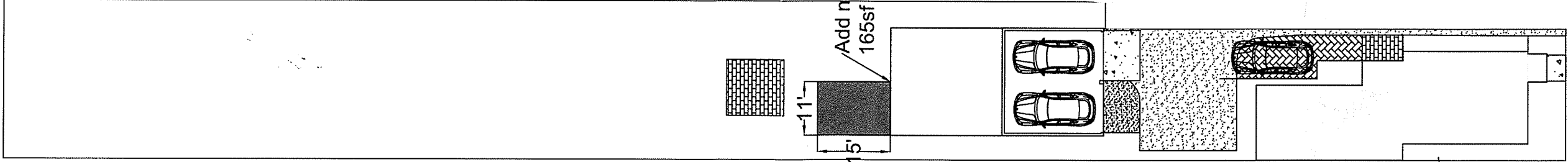
Date: 2/10/17
Scale: 3/16"=1'

Main Dwelling Finished Area = ^{1416?}1438 sf
Accessory Finished Area = 610 sf
Total Finished Area = ~~2048~~ 2077
Percent = ~~29.8%~~ 29.4%



- NOTE -
ANY MODIFICATION OR DEVIATIONS FROM THESE PLANS REQUIRE ZONING APPROVAL PRIOR TO CONSTRUCTION. ALL ERRORS IN DIMENSIONS, PLANS, OR DETAILING ARE FULLY THE RESPONSIBILITY OF THE APPLICANT/OWNER.

FINAL APPROVAL
SIGNED:
DATE: 3/22/17
Planning & Zoning Department
Burlington, Vermont

 The site plan shows a rectangular lot with an existing building footprint on the left and a proposed addition on the right. The addition is labeled 'Add new 165sf Addition'. A scale bar at the bottom indicates 0', 10', 20', 30', and 50'.	Existing Lot Coverage Impervious/ lot coverage = 2878.5sf Total Area = 9964.4 Percent Impervious = 28.8% Proposed Lot Coverage Impervious/ lot coverage = 3390.3sf Total Area = 9964.4 Percent Impervious = 34%						
410 North Street Garage Addition Renovations	Scott Goodwin (Owner) 802-922-6336 410 North St. Burlington, VT 05401	Permit Set Revised 2/10/17 RECEIVED FEB 16 2017 DEPARTMENT OF PLANNING & ZONING	0' 10' 20' 30' 50'	Proposed Site Plan	SP-1	Date: 2/10/17 Scale: 1/2"=10'	

Department of Planning and Zoning

149 Church Street
Burlington, VT 05401
Telephone: (802) 865-7188
(802) 865-7195 (FAX)
(802) 865-7142 (TTY)

David White, AICP, Director
Meagan Tuttle, AICP, Comprehensive Planner
Jay Appleton, GIS Manager
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Ryan Morrison, CFM, Associate Planner
Anita Wade, Zoning Clerk
vacant, Department Secretary



TO: Development Review Board
FROM: Scott Gustin
DATE: May 2, 2017 *SG*
RE: 17-0896SD; 311-375 North Avenue

Note: These are staff comments only; decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

Zone: NAC-CR Ward: 4N

Owner/Applicant: 375 North Avenue, LLC/BCCH/VLTBTBTV Parkland, LLC

Request: Final plat review of 11-lot subdivision (8 net new lots and a public road ROW). No development included.

Applicable Regulations:

Article 4 (Zoning Maps and Districts), Article 6 (Development Criteria & Guidelines), and Article 10 (Subdivision)

Background Information:

The applicant is seeking final plat approval for an 11-lot subdivision. Presently, there are 3 lots. As proposed, there will be 11 lots for a net gain of 8 new parcels. A new public road ROW will also be established. No development is included in this subdivision. All development anticipated on the subject lands is under separate zoning permit.

Preliminary plat approval was granted October 19, 2016 subject to the following conditions:

1. This preliminary plat approval in no way grants or implies final plat approval.
2. Within 1 year of preliminary plat approval, a complete final plat application shall be submitted. Otherwise, the preliminary plat approval will expire unless extended by the DRB following written request by the applicant.
3. The final plat plan shall eliminate to the extent feasible irregular boundary lines. Insofar as feasible, new boundary lines shall be perpendicular or radial to the street ROW line.

The final plat application has been filed within 1 year as required. No correction of irregular lot lines is evident in the final plat plans.

Recommendation: Initial final plat review and continuation as per the outstanding item related to irregular lot lines.

I. Findings

Article 4: Maps & Districts

Sec. 4.4.2, Neighborhood Mixed Use Districts:

(a) Purpose

(4) Neighborhood Activity Center – Cambrian Rise (NAC-CR)

The Neighborhood Activity Center – Cambrian Rise District is intended to create a new center for mixed use development that allows for a range of housing types and tenures, and to accommodate a diverse range of complimentary general office, institutional and neighborhood oriented small-scale retail and service uses. Development should be compact, pedestrian-oriented and enhance the community with creative design, durable materials, and quality construction. Buildings should be oriented towards the streets. Human scale elements should help to define new streets as civic spaces. Parking should be located as to be screened from view from public streets and community spaces.

No new development is included in this subdivision. The newly created parcels are proposed, in large part, for the ownership structure of buildings in the recently approved Cambrian Rise development on the subject property. **(Affirmative finding)**

(b) Dimensional Standards & Density

There are no minimum lot size or street frontage requirements in the NAC-CR zone. Building FAR, lot coverage, and building height are unaffected by the proposed subdivision. **(Affirmative finding)**

(c) Permitted & Conditional Uses

Not applicable.

(d) District Specific Regulations

Not applicable.

Article 6: Development Review Standards:

Part 1, Land Division Design Standards

(a) Protection of important natural features

Much of the wooded portions of the property and all of its lakefront are contained in the 12 acre Lot 11 that was configured as part of a previous lot line adjustment. This parcel is intended as an urban wild under city ownership. None of the other parcels affect any significant natural area as identified in the Open Space Protection Plan. **(Affirmative finding)**

(b) Block size and arrangement

A single block is proposed, and it is defined by a newly proposed public street right-of-way. This ROW will form the spine of the subdivision, providing road frontage for the new lots and connecting them to the city's street network. **(Affirmative finding)**

(c) Arrangement of Lots

Lots are consistently arranged along the newly proposed public street ROW. As noted previously, all proposed lots will be ~ 1 acre or larger in size. Lots in the surrounding area vary widely in size. A number of proposed lots contain irregular boundary lines, especially lots 2 and 3 and lots 8 and 9. To the greatest extent feasible, newly created lot lines should be perpendicular or radial to the street ROW line. Correction of these irregular lot lines is a condition of the preliminary plat

approval. No adjustment of these irregular lot lines is evident in the final plat. Correction is needed. **(Adverse finding)**

(d) Connectivity of streets within the city street grid

The subdivision plat depicts a new public street ROW. Actual street construction details have been reviewed separately as part of the Cambrian Rise zoning permit. For the purposes of this subdivision, the proposed public street ROW will enable connection of the lots to the city's public street network. **(Affirmative finding)**

(e) Connectivity of sidewalks, trails, and natural systems

Street, sidewalk, trail, and natural systems connectivity have been reviewed and considered under separate zoning permit application for development of the subject parcels. As noted above, the proposed public street ROW will enable connectivity of streets and sidewalks within the subdivision to the city's entire network. **(Affirmative finding)**

Part 2, Site Plan Design Standards

Sec. 6.2.2, Review Standards

Not applicable.

Part 3, Architectural Design Standards

Sec. 6.3.2, Review Standards

Not applicable.

Article 10: Subdivision

Sec. 10.1.8, Preliminary Plat Review

D. Review Criteria

Decisions by the DRB on a preliminary plat shall be based on the project's conformance with the following:

- 1. The requirements of the underlying zoning district(s) and all applicable overlay district(s) as set forth in Article 4;*
See Article 4 above.
- 2. The review criteria for Conditional Uses and Major Impact in Article 3, Part 5 where applicable;*
Not applicable.
- 3. The requirements of Article 5 with regard to Special Uses and Performance Standards as applicable; and,*
Not applicable.
- 4. The land division and site development principles and design standards in Article 6.*
See Article 6 above.

II. Conditions of Approval

In the event that the DRB finds that final plat approval is warranted, the following conditions of approval are recommended.

1. Within 180 days of approval, a mylar copy of the approved final plat, with all applicable signatures, shall be filed in the city's land records. Failure to do so renders this approval null and void.
2. Standard conditions 1-15.

Scott Gustin

From: Norm Baldwin
Sent: Monday, April 03, 2017 9:50 AM
To: Scott Gustin; Jesse Bridges; Barry Simays
Cc: Chapin Spencer
Subject: RE: 329-375 North Ave subdivision

Scott,

I have only one comment.

Why would the southernmost East West right of way for the proposed street be narrowed from 64 feet to 58 feet at the intersection of North Ave and the new street? Why not have a uniform width?

From: Scott Gustin
Sent: Monday, April 03, 2017 9:15 AM
To: Norm Baldwin <nbaldwin@burlingtonvt.gov>; Jesse Bridges <jbridges@burlingtonvt.gov>; Barry Simays <BSimays@burlingtonvt.gov>
Subject: 329-375 North Ave subdivision

Attached, please find the final plat plans for the subdivision related to the mixed use Cambrian Rise development. No development is included in this application – just the subdivision of land into separate lots. Preliminary plat approval was granted in October 2016, and the mixed use development was approved in February 2017. This final plat application is scheduled for the Development Review Board’s May 2, 2017 meeting. Please have your comments, if any, to me no later than April 21, 2017.

Thank you.

Scott

Scott Gustin, AICP, CFM
Principal Planner & Asst. Administrative Officer
Dept. of Planning & Zoning
149 Church Street
Burlington, VT 05401
(802) 865-7189

Please note that this communication and any response to it will be maintained as a public record and may be subject to disclosure under the Vermont Public Records Act.

This plat is in substantial compliance with 27 VSA 1403, "Recording of Land Plats".

VT LS 597

Timothy R. Cowan

- Survey Notes -

- Purpose of this survey and plat is to depict the subdivision of lands of BC Community Housing, LLC, into twelve (12) lots and a proposed street as shown. Other property lines shown MAY BE approximate, and are for reference purposes only.
- Land areas shown are calculated to the side line of North Avenue as shown, and to the 93-foot contour of Lake Champlain, representing the recognized "Low Water Mark" of the lake. Submerged lands are subject to certain rights of the public under the so-called "Public Rights Doctrine". Acreage shown does NOT include 1.76 acres of land traversed by the former railroad right-of-way. (See Railroad ROW Note 1 of Reference Plat A.)
- Field survey was conducted during late autumn 2014 and consisted of a closed loop traverse utilizing electronic total station instruments. Bearings shown are from Grid North, Vermont Coordinate System of 1983, based upon our GPS observations at the site.
- Proposed corner markers shall typically consist of 5/8" x 30" steel rebar or 4" x 4" concrete monuments with aluminum caps or disks stamped "Civil Engineering Assocs. - VT LS 597", typically set flush with existing grade.
- Concrete monuments found are typically 4" square unless otherwise noted. Concrete monuments set (2014) are typically 4" square with aluminum disks stamped "Civil Engineering Assocs. - VT LS 597". Iron pipes found were 1" inside diameter unless otherwise noted. Iron rods found are 5/8" diameter unless otherwise noted.

- Referenced Maps or Plats -

- "Lot Line Adjustment Between 311 & 329 North Avenue - BC Community Housing LLC", dated 1/18/2016, prepared by Civil Engineering Associates, Inc. Burlington Land Records Map Slide 521-D.
- "Lot Line Adjustment Between 329 & 351 North Avenue - Burlington College", dated 12/18/2014, prepared by Civil Engineering Associates, Inc. Burlington Land Records Map Slide 509-C.
- "Plat of Land 311 & 351 North Avenue, City of Burlington, Vermont", dated 10/18/1974, prepared by Knight Consulting Engineers, Inc. Diocese Archives.
- "Plat of Survey, Roman Catholic Diocese of Burlington, No. 311 & 351 North Avenue", dated 12/13/2010, prepared by W.A. Robenstien. Diocese Archives.

APPROVED BY RESOLUTION OF THE CITY OF BURLINGTON DEVELOPMENT REVIEW BOARD, BURLINGTON, VERMONT, ON THIS DAY OF 20 SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF THE COMPREHENSIVE DEVELOPMENT ORDINANCE OF THE CITY OF BURLINGTON, VERMONT.

SIGNED THIS DAY OF 20 BY: DRB CHAIR

WITNESS DRB CHAIR

ZONING PERMIT/CERTIFICATE OF APPROPRIATENESS #

Certificate of City Engineer:

I, _____, City Engineer, do hereby certify that the subject plat has been examined by me and found to comply with the engineering requirements set forth in the regulations governing plats of subdivided land adopted by the city council, with the following exceptions, if any:

City Engineer

Certificate of City Fire Marshal:

I, _____, Fire Marshal do hereby certify that the subject plat has been examined by me and found to comply with the fire prevention requirements set forth in this chapter governing plats of subdivided land adopted by the city council with the following exceptions, if any:

City Fire Marshal

Certificate of Superintendent of City Parks:

I, _____, Superintendent of Parks do hereby certify that the subject plat has been examined by me and found to comply with the street planting requirements and park area requirements set forth in the regulations governing plats of subdivided land adopted by the city council with the following exceptions, if any:

City Superintendent of Parks

Applicant's Certification:

The owner of the land shown on this plat and whose name is subscribed hereto, in person or through a duly authorized agent, certifies that this plat was made from an actual survey.

Agent/Owner

Date

- Zoning -

Proposed Lots 1 - 10, and most of Lot 11 are within the "Waterfront Residential / Medium Density" District (RM-W).

Proposed Lot 11 westerly of railway ROW is within the "Recreation Green Space" District (RCO-RG).

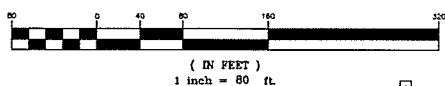
Legend of Symbols -

- SUBJECT PROPERTY LINE
- OTHER PROPERTY LINE
- FORMER PROPERTY LINE (NOT ALL SHOWN)
- EXISTING FENCE (CHAIN LINK)
- EXISTING FENCE (WIRE)
- IRON PIPE / ROD FOUND
- CONCRETE MONUMENT FOUND
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- CONCRETE MONUMENT PROPOSED (2016)
- CAPPED IRON ROD PROPOSED
- ABOVE GRADE / BELOW GRADE
- EXISTING UTILITY POLE
- EXISTING GUY WIRE/POLE

North Ave. Ownership

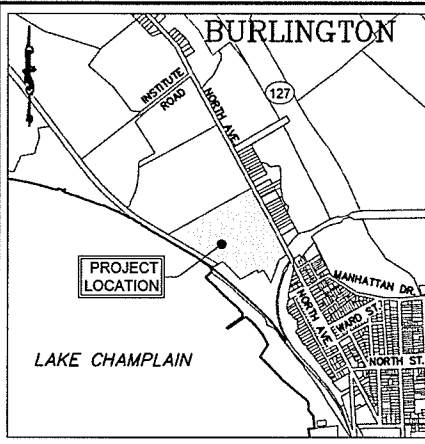
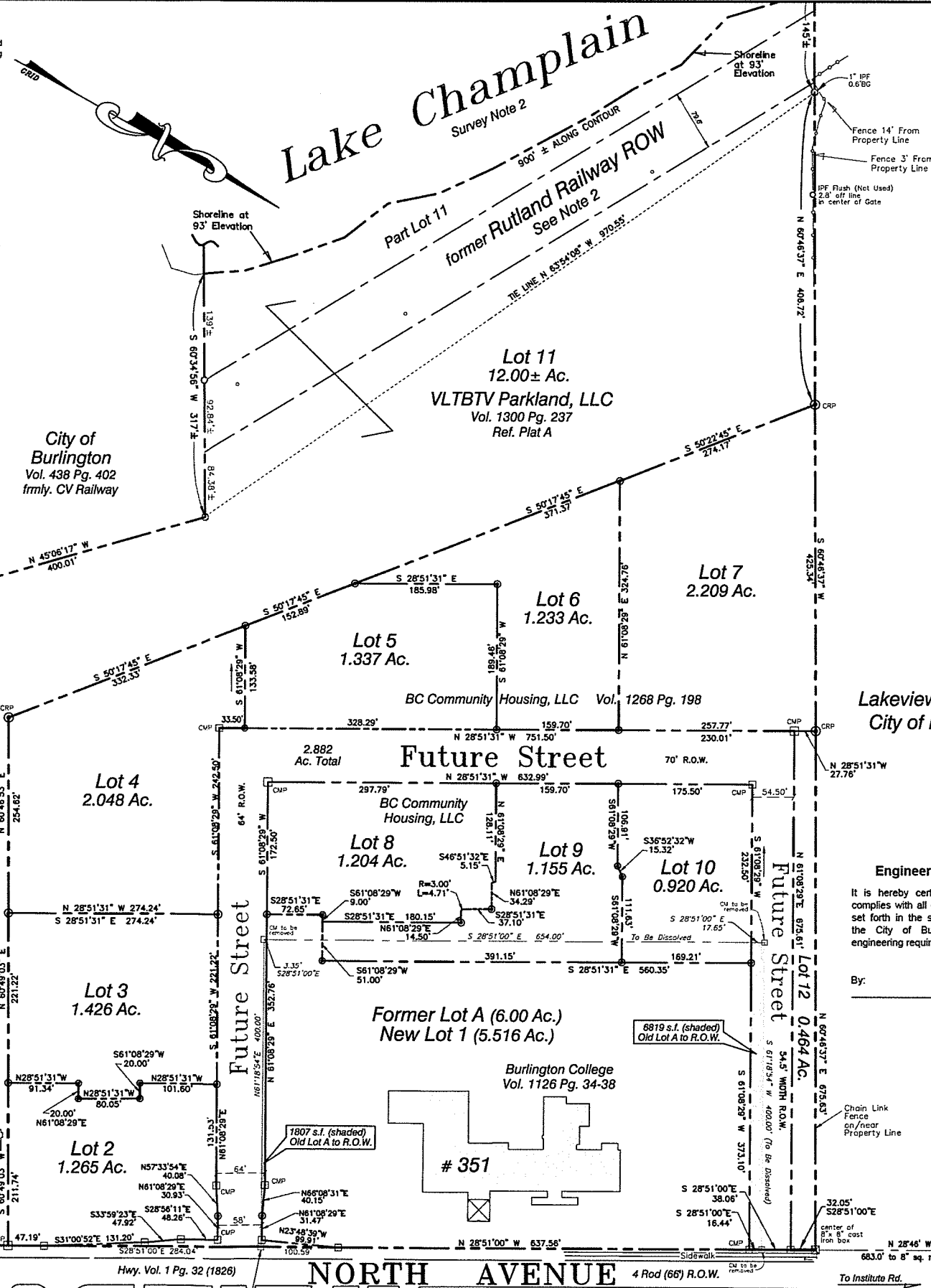
St. #	Name
328	NOVA Enterprises, LLC
336	W R C C
342	Ruddy
346	McCormick
352	Brown
358	Akey Trust
360	Mai
366	DeMag
372	Burdin
376, 378	Rising
380, 382	JPT Properties LLC
392	Lafayette
402	McSweeney
404, 406	Maher
412	Rossman
422	Scott

GRAPHIC SCALE



RECEIVED FOR RECORDING IN THE LAND RECORDS OF THE CITY OF BURLINGTON, VERMONT, AT O'CLOCK ON THE DAY OF 20

ATTEST: CITY CLERK



- Location Map -

NOT TO SCALE

To the best of my knowledge and belief this plat depicts the results of a survey conducted by me as described in "Survey Notes" hereon, based upon our analysis of land records and evidence found in the field. Existing boundaries shown are in substantial conformance with the records, except as noted.

ALSO

To the best of my knowledge and belief this plat is true and correct and was prepared from an actual survey of the property by me or under my supervision; that all monuments shown hereon actually exist or are marked as "proposed" and their location, size, type and materials are correctly shown. This statement valid only when accompanied by my original signature and seal below.

SEAL

Timothy R. Cowan VT LS 597

SURVEYORS:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 web: www.cae-vt.com

COPYRIGHT © 2017 - ALL RIGHTS RESERVED

DATE	CHK'D	REVISION
03.23.17	TRC	"Future Street" Name
01.12.17	TRC	Add Lot 12, Revise R.O.W.

Subdivision Plat
BC Community Housing, LLC

311 & 329 North Avenue
Burlington, Vermont

DATE AUG. 29, 2016
ORIGINAL SCALE 1" = 80'
PROJ. NO. 14215

DRAWING NUMBER
P 1

SHEET 1 of 1

Preliminary Plat

- Survey Notes -

1. Purpose of this survey and plat is to depict the subdivision of lands of BC Community Housing, LLC, into eleven (11) lots and a proposed street as shown. Other property lines shown MAY BE approximate, and are for reference purposes only.
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Agent/Owner

Date

- Zoning -

Proposed Lots 1 - 10, and most of Lot 11 are within the "Waterfront Residential / Medium Density" District (RM-W).

Proposed Lot 11 westerly of railway ROW is within the "Recreation Green Space" District (RCO-RG).

APPROVED BY RESOLUTION OF THE CITY OF BURLINGTON DEVELOPMENT REVIEW BOARD, BURLINGTON, VERMONT, ON THIS DAY OF _____, 20____, SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF THE COMPREHENSIVE DEVELOPMENT ORDINANCE OF THE CITY OF BURLINGTON, VERMONT.

SIGNED THIS _____ DAY OF _____, 20____,

BY _____

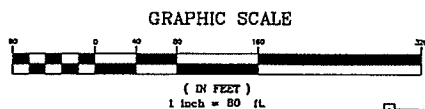
WITNESS _____ DRB CHAIR

ZONING PERMIT/CERTIFICATE OF APPROPRIATENESS # _____

- Legend of Symbols -

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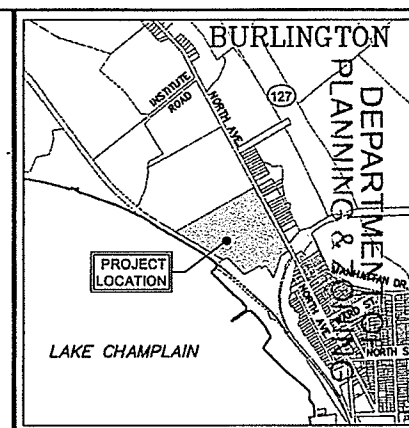
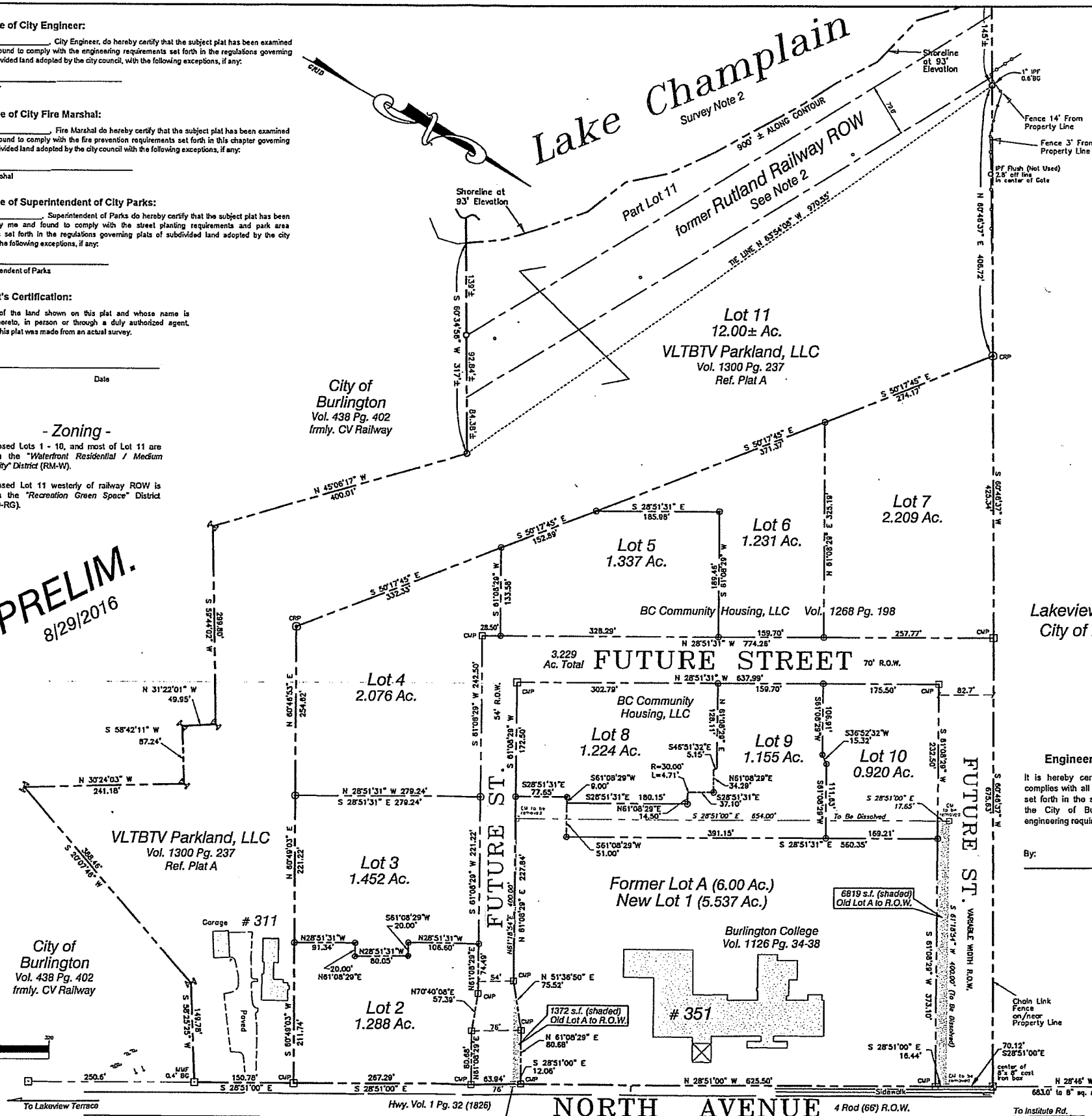
North Ave. Ownership (East side of Avenue)	
St. #	Name
328	NOVA Enterprises, LLC
336	W.R.C.C.
342	Ruddy
346	McComick
352	Brown
358	Akey Trust
360	Mal
366	DeMag
372	Burdin
376, 378	Rising
380, 382	JPT Properties LLC
392	LaFayette
402	McSweeney
404, 406	Maher
412	Rossman
422	Scott



RECEIVED FOR RECORDING IN THE LAND RECORDS OF THE CITY OF BURLINGTON, VERMONT, AT O'CLOCK ON THE _____ DAY OF _____, 20____.

ATTEST: _____ CITY CLERK

PRELIM.
8/29/2016



- Location Map -

NOT TO SCALE

To the best of my knowledge and belief this plat depicts the results of a survey conducted by me as described in "Survey Notes" hereto, based upon our analysis of land records and evidence found in the field. Existing boundaries shown are in substantial conformance with the records, except as noted.

ALSO
To the best of my knowledge and belief this plat is true and correct and was prepared from an actual survey of the property by me or under my supervision; that all monuments shown hereon actually exist or are marked as "proposed" and their location, size, type and materials are correctly shown. This statement valid only when accompanied by my original signature and seal below.

PRELIM.
8/29/2016

Timothy R. Cowan VT LS 597

SURVEYORS:
CIVIL ENGINEERING ASSOCIATES, INC.
10 HANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-664-2222 web: www.cae-vt.com

DATE: _____ CHECKED: _____ REVISION: _____

DATE: _____ CHECKED: _____ REVISION: _____

DATE: _____ CHECKED: _____ REVISION: _____

DATE: _____ CHECKED: _____ REVISION: _____

DATE: _____ CHECKED: _____ REVISION: _____

DATE: _____ CHECKED: _____ REVISION: _____

DATE: _____ CHECKED: _____ REVISION: _____

Subdivision Plat
BC Community Housing, LLC
311 & 329 North Avenue
Burlington, Vermont

DATE: AUG. 29, 2016
ORIGINAL SCALE: 1" = 80'
PROJ. NO. 14215

DRIVING NUMBER: P1
SHEET 1 of 1

ORIGINAL INK on MYLAR - REDUCED for RECORDING

Department of Planning and Zoning

149 Church Street
Burlington, VT 05401
Telephone: (802) 865-7188
(802) 865-7195 (FAX)
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David White, AICP, Director
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Ryan Morrison, CFM, Associate Planner
Anita Wade, Zoning Clerk
vacant, Department Secretary



TO: Development Review Board
FROM: Scott Gustin *SG*
DATE: May 2, 2017
RE: 17-0825CA/MA; 85 North Avenue

Note: These are staff comments only; decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

Zone: NMU Ward: 3C

Owner/Applicant: Catamount/Lakeview, LLC

Request: Construction of a 43-unit residential building with associated parking and site improvements

Applicable Regulations:

Article 3 (Applications, Permits, and Project Reviews), Article 4 (Maps & Districts), Article 5 (Citywide General Regulations), Article 6 (Development Review Standards), Article 8 (Parking), Article 9 (Inclusionary & Replacement Housing)

Background Information:

The applicant is seeking approval to construct a 43-unit residential structure with associated parking and site improvements. The parcel presently consists of a parking lot at the bottom of Lakeview Terrace and a vegetated bluff with steep slopes to the south and west. As proposed, the building would be set atop the hillside at the western edge of the present parking area. Parking will be provided on the first level with apartments above. Associated surface parking and site improvements would be located generally to the east of the proposed building.

This project underwent sketch plan review with the Design Advisory Board on November 24, 2015 and with the Development Review Board on December 1, 2015. At the time, the project was larger with 53 apartments, and the building was to be set into the hillside. It is now 43 apartments, and very little earthwork is now proposed. Where the slope falls away to the west, the building will be held up by columns rather than set into the grade. Sketch plan comments were generally favorable as to the building design. Suggestion was made to increase the usable space around the building, particularly along its primary frontage. Recommendation was also made to improve access to the public sidewalk and the street.

The Conservation Board reviewed this application on March 6, 2017. The Board was 1 member short of a quorum. Those members present voted 4-0-0 to recommend approval of the project and made the following comment relative to stormwater offsets to reduce impacts on the combined sewer system: Those board members present prefer the stormwater offset option to send stormwater to an infiltration gallery at edge of Battery Park. In working with the city's

Stormwater Program staff, an alternative offset location – at the dead end of Front Street – is more likely. There is concern with disturbing historical grave sites at the Battery Park location.

The Design Advisory Board reviewed this project March 28, 2017. The Board voted 5-0-0 to recommend approval of the project with the following conditions:

1. Add crosswalk at the end of Lakeview Terrace.
2. Add architectural screening on the southwest of the parking level. Screening shall block lighting from cars and be complementary to the building. It shall focus heavily on the lower half of the opening, with the purpose of screening view of the cars from the waterfront.
3. Sidewalk (circling building on south of site) shall terminate at the easement line, not to extend past the parking area and crossing easement.
4. Increase caliper of trees within the crescent shaped island to 5-6” caliper.

Revised project plans have been submitted to address the DAB’s recommendation.

Previous zoning actions for this property are noted below.

- 12/1/15, Sketch plan review of 56-unit residential building
- 12/12/12, Zoning determination as to unpermitted 1991 subdivision

Recommendation: **Certificate of Appropriateness & Major Impact approval**, as per, and subject to, the following findings and conditions below:

I. Findings

Article 3: Applications and Reviews

Part 5, Conditional Use & Major Impact Review:

Section 3.5.6 (a) Conditional Use Review Standards (as adopted by City Council 8.10.2015.)

Approval shall be granted only if the DRB, after public notice and public hearing, determines that the proposed conditional use and associated development shall not result in an undue adverse effect on each of the following general standards:

- 1. Existing or planned public utilities, facilities or services are capable of supporting the proposed use in addition to the existing uses in the area;*

The proposed residential building will be served by the municipal water and wastewater systems. Adequate reserve capacity is available; however, written confirmation from the Department of Public Works is required before a state wastewater permit can be issued. **(Affirmative finding as conditioned)**

- 2. The character of the area affected as defined by the purpose or purposes of the zoning district(s) within which the project is located, and specifically stated policies and standards of the municipal development plan;*

The subject property is part of the Neighborhood Mixed Use (NMU) zone that extends eastward up much of North Street and along North Winooski Avenue. This zone is intended primarily to preserve and enhance historically commercial areas while reinforcing the compact scale and

development patterns of the city's older neighborhoods. Uses are intended to provide neighborhood oriented goods and services and employment opportunities within walking or biking distance of residential neighborhoods. The proposed development is exclusively residential but sits within close proximity to commercial uses within the NMU zone. Residents of the would-be building will live within easy walking distance of a variety commercial uses. The proposed residential structure fits within the scale and mixed use context of the NMU zone. **(Affirmative finding)**

3. *The proposed use will not have nuisance impacts from noise, odor, dust, heat, and vibrations greater than typically generated by other permitted uses in the same zoning district;*

The proposed construction is wholly residential. It is not expected to generate exceptional noise, odor, dust, heat, or vibrations. **(Affirmative finding)**

4. *The transportation system is capable of supporting the proposed use in addition to the existing uses in the area. Evaluation factors include street designations and capacity; level of service and other performance measures; access to arterial roadways; connectivity; transit availability; parking and access; impacts on pedestrian, bicycle and transit circulation; safety for all modes; and adequate transportation demand management strategies;*

A traffic analysis has been provided to forecast potential traffic impacts related to the development. Note that anticipated traffic volumes fall well short of the typical 75 PM peak hour trip end threshold for triggering a traffic study. Given the relatively low numbers, the traffic study is fairly basic, focusing only on anticipated trip ends and level of service (LOS) at one intersection: North St/North Ave/Depot St.

Anticipated trip generation totals 172 daily vehicle trip ends. Of that total, 13 AM peak hour trip ends and 16 PM peak hour trip ends are anticipated. Note that these figures reflect a downward adjustment of 40% from ITE numbers. The Department of Public Works has questioned this degree of adjustment and is looking to review the numbers further with the traffic consultant.

LOS impacts at North Ave/North St/Depot St are minimal under the "build" scenario. Only overall LOS is noted. There is no analysis of individual turning movement LOS as is typically done. Given the modest anticipated impacts, analysis of individual turning movements may not be needed unless required by the Department of Public Works.

Significantly, the traffic analysis does not appear to account for traffic associated with the recently approved Cambrian Rise development at 329 North Avenue. This intersection was part of the traffic analysis for that development. Overall LOS figures in the Cambrian Rise analysis match those in this traffic study; however, there is more detailed analysis as to individual turning movements. While Cambrian Rise is expected to generate much more traffic than this 43-unit proposal, the traffic study should be adjusted to account for the anticipated Cambrian Rise numbers. **(No finding possible)**

and,

5. *The utilization of renewable energy resources;*

No utilization of renewable energy resources is included in the project plans. Given the site's significant southern exposure, conduit will be installed to enable future solar panel installation. **(Affirmative finding)**

and,

6. *Any standards or factors set forth in existing City bylaws and city and state ordinances;*

No identified conflicts. Required building and/or life safety codes will be under the review of the building inspector. **(Affirmative finding)**

(b) Major Impact Review Standards

1. *Not result in undue water, air, or noise pollution;*

The proposed construction is not expected to result in undue water, air, or noise pollution. Stormwater is addressed under Sec. 5.5.3. **(Affirmative finding)**

2. *Have sufficient water available for its needs;*

See Sec. 3.5.6 (a) 1.

3. *Not unreasonably burden the city's present or future water supply or distribution system;*

See Sec. 3.5.6 (a) 1.

4. *Not cause unreasonable soil erosion or reduction in the capacity of the land to hold water so that a dangerous or unhealthy condition may result;*

A comprehensive erosion prevention and sediment control plan is included in the application. It is subject to review and approval by the city's Stormwater Program staff. **(Affirmative finding as conditioned)**

5. *Not cause unreasonable congestion or unsafe conditions on highways, streets, waterways, railways, bikeways, pedestrian pathways or other means of transportation, existing or proposed;*

See Sec. 3.5.6 (a) 3 for traffic impacts. The project is not expected to cause exceptional congestion or unsafe conditions on nearby sidewalks, streets, bikeways or other means of transportation. Given the project's location, multiple forms of transportation will be readily available: pedestrian, bike, personal vehicle, and city bus. No one mode of transportation is expected to generate unreasonable impacts to existing infrastructure. **(Affirmative finding)**

6. *Not cause an unreasonable burden on the city's ability to provide educational services;*

This new residential building may contain families with school age children; however, the unit mix is unlikely to generate significant numbers. Apartments will consist of 24 efficiency units, 9 one-bedroom units, and 10 two-bedroom units. Impact fees will be paid to help offset what impact there are on city schools. **(Affirmative finding as conditioned)**

7. *Not place an unreasonable burden on the city's ability to provide municipal services;*

Project review by the Technical Review Committee took place December 10, 2015. Follow up written comments have been provided to the applicant. No departments asserted unreasonable burdens associated with this project. Impact fees will be paid to help offset what impacts there are on municipal services. **(Affirmative finding as conditioned)**

8. Not have an undue adverse effect on rare, irreplaceable or significant natural areas, historic or archaeological sites, nor on the scenic or natural beauty of the area or any part of the city;
See Sec. 6.2.2 (a) & 6.3.2 (b).

9. Not have an undue adverse effect on the city's present or future growth patterns nor on the city's fiscal ability to accommodate such growth, nor on the city's investment in public services and facilities;

The proposed development will transform an underutilized site with just a surface parking lot into a significant residential structure with improved surface parking and circulation. The project will take place within a zoning district that enables development at a higher density than nearby residential zones. It will have no adverse impact on the city's present or future growth patterns.

(Affirmative finding)

10. Be in substantial conformance with the city's municipal development plan;

The project is consistent with a number of provisions within the MDP.

The proposed development is within an identified Neighborhood Activity Center, wherein new and higher density development is to be targeted (Land Use Policies, pg. I-2 & Neighborhood Activity Centers, pg. I-20).

The property is located at the western end of the North Street Commercial District. While not commercial in nature, the proposed development will provide 43 units of housing in close proximity to the diverse mix of uses within this district (North Street Commercial District, pg. I-21). The property is also contained within the Old North End Enterprise Community, an area of the city where redevelopment is actively promoted (Old North End Enterprise Community, pg. I-27).

The subject property is located in immediate proximity to a variety of transportation options, including the city's street network, sidewalks, bikeways, and bus routes (Stressing Other Modes of Travel, pg. V-12).

The new housing in this proposal will add to the city's housing stock and will do so in an area targeted for higher density development (City Policies, pg. IX-1). **(Affirmative finding)**

11. Not have an undue adverse impact on the present or projected housing needs of the city in terms of amount, type, affordability and location;

This project will bring about 43 units of new housing of varying unit size within an area targeted for redevelopment. It will have no adverse impact on the present or projected housing needs of the city. **(Affirmative finding)**

12. Not have an undue adverse impact on the present or projected park and recreation needs of the city.

Residents of the project will likely utilize the city's parks and recreation resources; however, impacts are expected to be moderate and typical of new residential development. Impact fees will be paid to help offset what impacts there are on park resources. **(Affirmative finding as conditioned)**

(c) Conditions of Approval:

In addition to imposing conditions of approval necessary to satisfy the General Standards specified in (a) or (b) above, the DRB may also impose additional conditions of approval relative to any of the following:

1. Mitigation measures, including but not limited to screening, landscaping, where necessary to reduce noise and glare and to maintain the property in a character in keeping with the surrounding area.

The proposed development is not expected to generate offsite noise or glare substantial enough to require mitigation. **(Affirmative finding)**

2. Time limits for construction.

The applicants propose to build the development in a single phase within the standard 2-year time frame. Therefore, no phasing schedule or special time limits on construction are needed.

(Affirmative finding)

3. Hours of operation and/or construction to reduce the impacts on surrounding properties.

Hours of operation do not pertain to the proposed residential development.

No days or hours of construction are noted in the application. Typical days and hours of construction within residential neighborhoods are Monday – Friday, 7:00 AM – 6:00 PM. Only interior construction on Saturdays, and no construction on Sundays. **(Affirmative finding as conditioned)**

4. That any future enlargement or alteration of the use return for review to the DRB to permit the specifying of new conditions; and,

Any future enlargement or alteration will be reviewed under the zoning regulations in effect at that time.

5. Such additional reasonable performance standards, conditions and safeguards, as it may deem necessary to implement the purposes of this chapter and the zoning regulations.

To be addressed in conditions of approval.

Article 4: Maps & Districts

Sec. 4.4.2, Neighborhood Mixed Use Districts:

(a) Purpose

(2) Neighborhood Mixed Use (NMU)

The Neighborhood Mixed Use District is intended to preserve and enhance historically commercial areas while reinforcing the compact scale and development patterns within the city's older neighborhoods. Uses are intended to provide neighborhood oriented goods and services and employment opportunities within walking or biking distance of residential neighborhoods. As noted previously, residents of the would-be building will live within easy walking distance of a variety commercial uses. The proposed residential structure fits within the scale and mixed use context of the NMU zone. **(Affirmative finding)**

(b) Dimensional Standards & Density

FAR in the NMU zone is limited to 2.0. An additional 0.5 FAR is allowable in exchange for inclusionary housing (Table 9.1.13-1, *Density/Intensity Allowance Table*). As proposed, FAR will be 1.0.

Maximum standard lot coverage is 80% in the NMU zone. That maximum may be increased up to 92% for inclusionary housing per Table 9.1.13-2, *Lot Coverage Allowance Table*. As proposed, lot coverage will increase from 41% to 63%.

The subject property has two road frontages. It, therefore, contains two front yards and two side yards. There is no rear yard for the purposes of setback requirements. The proposed building complies with the 15' residential district setback and with the 12' curb line setback.

Within the NMU zone, the standard building height limit is 35', and the minimum is 20'. Buildings shall be at least 2 stories. With the required inclusionary housing, the maximum height may increase an additional 10' (Table 9.1.13-1, *Density/Intensity Allowance Table*). As proposed, the building is 40' tall to the midpoint of the sloped roof. **(Affirmative finding)**

(c) Permitted & Conditional Uses

Multifamily residential development is a permitted use in the NMU zone. **(Affirmative finding)**

(d) District Specific Regulations

Not applicable, except for inclusionary bonus as noted above.

Article 5: Citywide General Regulations

Sec. 5.2.3, Lot Coverage Requirements

See Sec. 4.4.2 (b).

Sec. 5.2.4, Buildable Area Calculation

See Sec. 4.4.2 (b).

Sec. 5.2.5, Setbacks

See Sec. 4.4.2 (b).

Sec. 5.2.6, Building Height Limits

See Sec. 4.4.2 (b).

Sec. 5.2.7, Density and Intensity of Development Calculations

See Sec. 4.4.2 (b).

Sec. 5.5.1, Nuisance Regulations

Nothing in the proposal appears to constitute a nuisance under this criterion. **(Affirmative finding)**

Sec. 5.5.2, Outdoor Lighting

Outdoor lighting information has been provided, including a photometric plan and fixture cutsheets. Acceptable illumination levels are depicted in all lighting environments. The outdoor fixtures themselves are acceptable cutoff fixtures. The fixture within the garage is not cutoff, nor does it need to be. Acceptable illumination levels are depicted within the garage. **(Affirmative finding)**

Sec. 5.5.3, Stormwater and Erosion Control

Present site conditions include no stormwater management. As proposed, stormwater runoff from the building's roof and associated parking area will be captured and directed into an onsite system for attenuation and infiltration into the ground. Overflow will be directed into the separate storm sewer. No stormwater from this project will enter the combined sewer system. Final review and approval by the city's Stormwater Program is required. **(Affirmative finding as conditioned)**

Article 6: Development Review Standards

Part 1, Land Division Design Standards

Not applicable.

Part 2, Site Plan Design Standards

Sec. 6.2.2, Review Standards

(a) Protection of important natural features

The site contains no significant natural areas as identified in the Open Space Protection Plan. The slope is vegetated with a variety of vegetation, including trees, shrubs, and ground cover. The project plans denote the proposed limits of clearing. **(Affirmative finding)**

(b) Topographical alterations

The existing surface parking lot is flat. The slope precipitously drops away to the south and west beyond the edges of the existing asphalt. Rather than alter the slope and set the building into it, the proposal calls for setting the building at grade along its primary façade and holding it up with columns as the slope falls away to the south and west. Little in the way of topographical alteration is evident in the topographic plans. **(Affirmative finding)**

(c) Protection of important public views

There are significant views from the project site across the lake and towards the Adirondacks. These views, however, are not part of any defined view corridor (such as those along Main, College, Pearl, and Cherry Streets) and are not protected under this criterion. **(Affirmative finding)**

(d) Protection of important cultural resources

The project site consists of a surface parking lot and steep slopes. The site has no known archaeological significance. It contains no archaeological site points, nor is it located within an archaeologically sensitive area. **(Affirmative finding)**

(e) Supporting the use of alternative energy

See Sec. 6.3.2 (f).

(f) Brownfield sites

The site is included on the Vermont DEC Hazardous Site List. Contaminants related to fill and dumping include asbestos, coal tar, lead, and PAH. A corrective action plan with VT DEC may be required prior to construction, although relatively little earthwork is proposed. The applicant should be prepared to address this criterion and status of a CAP, if applicable. **(Affirmative finding as conditioned)**

(g) Provide for nature's events

As noted above, the project will introduce new stormwater management measures to the site. Stormwater runoff will be captured and directed into an onsite system for attenuation and

infiltration into the ground. Overflow will be directed into the separate storm sewer. No stormwater from this project will enter the combined sewer system.

Both pedestrian entryways are sheltered under projecting canopies. **(Affirmative finding)**

(h) Building location and orientation

The proposed building will take advantage of the expansive southerly and westerly views and will be set at the top of the bluff, set back from North Avenue. The Depot Street right-of-way effectively precludes setting the building up along North Avenue. As proposed, the building will continue the street edge set by existing homes along Lakeview Terrace. Two east-facing front entries reinforce the continuation of that established street edge. The front entries are clearly identifiable from the public street. **(Affirmative finding)**

(i) Vehicular access

Vehicles may access the site from Lakeview Terrace or from North Avenue. A single doorway affords access in and out of the garage. See Article 8 below for details as to parking and circulation dimensions. **(Affirmative finding)**

(j) Pedestrian access

The project includes a continuation of the sidewalk from Lakeview Terrace across the front of the proposed building. As such, it will be open to the public. As a privately owned site feature, it will be the owner's responsibility to ensure ongoing maintenance and accessibility. Both building entries will afford direct access onto the sidewalk. The associated crosswalk at the end of Lakeview Terrace, although on private property, should be installed only following consultation with the Department of Public Works. **(Affirmative finding as conditioned)**

(k) Accessibility for the handicapped

Handicap parking spaces are depicted in the project plans. They are located within the garage adjacent to the lobby. It is the applicant's responsibility to comply with all applicable ADA requirements. **(Affirmative finding)**

(l) Parking and circulation

This criterion calls for placement of new buildings in front, or to the side, of parking areas. The idea is to avoid parking in front of structures. In this case, the parking lot is already in place. As noted previously, the Depot Street right-of-way effectively precludes construction of a building along North Avenue (with parking behind). As proposed, the building will be set towards the western end of the property and will continue the street edge established along Lakeview Terrace.

The existing surface parking area will be reconstructed and restriped. A center landscaping island will also be installed. As revamped surface parking associated with this project amounts to only 11 spaces, no shade trees are required. As proposed, however, 4 new shade trees will be installed in the new landscaping island. They will be 5" – 6" caliper at planting per the DAB's recommendation. **(Affirmative finding)**

(m) Landscaping and fences

A landscaping plan is included in the project plans. It depicts several new shade trees in the surface parking area as noted above. In addition, landscaping is concentrated along the eastern

frontage of the new building and includes a variety of shrubs and flowering plants in addition to new grassy turf.

The trash area to the side of the new building will be screened with a wood slat enclosure.

(Affirmative finding)

(n) Public plazas and open space

No public plazas or open space are included in this proposal.

(o) Outdoor lighting

See Sec. 5.5.2.

(p) Integrate infrastructure into the design

No new outdoor mechanical equipment is apparent in the site plan. A trash enclosure is set to the side of the proposed building at the northeastern end of the site. Screening will consist of a slatted wood enclosure with a gate. Any new utility lines must be buried. **(Affirmative finding as conditioned)**

Part 3, Architectural Design Standards

Sec. 6.3.2, Review Standards

(a) Relate development to its environment

1. Massing, Height, and Scale

The proposed building is large, larger than the homes along Lakeview Terrace, but not dissimilar in scale to the newly renovated COTS building or the apartment building below Depot Street. The proposed structure incorporates distinct building elements defined by varying materials, planes, and sections. The slight “V” shape of the building further offsets the perceived mass of the structure. As depicted in perspective drawings from the southwest, the proposed building will be prominent atop the bluff. Height as perceived from North Avenue is unremarkable. The building is a full 3 stories with a partial 4th story set back from the front facade. A mechanical enclosure sits atop the 4th story. **(Affirmative finding)**

2. Roofs and Rooflines

The proposed building will include angular shed roofs and flat roof components. Flat and pitched roofs are common in the neighborhood. **(Affirmative finding)**

3. Building Openings

Fenestration is consistent throughout the building. It consists of boxy windows in various formations that repeat around the structure. The fenestration is consistent with the geometry of the proposed building. **(Affirmative finding)**

(b) Protection of important architectural resources

There are no structures onsite. Other structures nearby are historically significant. The proposed building is offset from these existing buildings and will have no direct impacts on their historic significance. **(Affirmative finding)**

(c) Protection of important public views

See 6.2.2 (c) above.

(d) Provide an active and inviting street edge

Lakeview Terrace ends at the northern end of the site. Depot Street and North Avenue lie to the east. The proposed development aims to continue the street edge from Lakeview Terrace out towards North Avenue. In doing so, it continues the Lakeview Terrace sidewalk across the front of the building. The building entries are well defined and connect directly to the sidewalk. The provision of street-level parking brings about a particular challenge to provide a lively, activated street presence. Street-level parking is fully screened as viewed from the front, and the Design Advisory Board determined that the street-level presence of the building was acceptable.

(Affirmative finding)

(e) Quality of materials

Exterior building materials consist of a variety of metal and fiber cement sidings. Windows will be fiberglass, and membrane roofing will be installed. As noted previously, screening for the dumpster and rooftop mechanicals will consist of wood slat material. Per the DAB's recommendation, slated screening will be installed around the periphery of the open-air parking garage. Note that the site plans depict solid walls around the garage except for along the west (back). The elevation plans seem to indicate open air on all sides but the east (front). Clarification is needed. **(Affirmative finding as conditioned)**

(f) Reduce energy utilization

Cold air heat pumps will be installed for the apartments. Gas will provide heat in common spaces. The application plans assert that the building will meet or exceed applicable energy efficiency codes. At a minimum, the new building must comply with the current energy efficiency requirements of the city and state. **(Affirmative finding)**

(g) Make advertising features complimentary to the site

An "85 North Avenue" sign is evident above the front entry. It is obviously larger than 2 sf and will, therefore, be subject to a separate sign permit. **(Affirmative finding as conditioned)**

(h) Integrate infrastructure into the building design

The aforementioned heat pumps will be installed on the rooftop. They will be set back from the front of the building and surrounded by slatted wood screening. Provision for mailboxes is not evident and must be included in the project plans. **(Affirmative finding as conditioned)**

(i) Make spaces safe and secure

The proposed building appears to be accessible by emergency service vehicles. The project underwent technical review by Police, Fire, Building, etc. on December 10, 2015. Comments from that review have been provided to the applicant. An intercom system connecting individual dwelling units with the front entry is recommended. **(Affirmative finding as conditioned)**

Article 8: Parking

Sec. 8.1.8, Minimum Off-Street Parking Requirements

The subject property is located in the Shared Use parking district. As such, it requires 1 parking space per dwelling unit. As proposed, 43 parking spaces are proposed for the 43 dwelling units. Sufficient parking will be provided. **(Affirmative finding)**

Sec. 8.1.10, Off-Street Loading Requirements

Not applicable.

Sec. 8.1.11, Parking Dimensional Requirements

Project plans depict garage and surface parking spaces and related circulation aisles. Parking spaces are striped at 18' with back-up lengths of 24' or more. Dimensions are acceptable.

(Affirmative finding)

Sec. 8.1.12, Limitations, Location, Use of Facilities

(a) Off-Site Parking Facilities

None proposed.

(b) Downtown Street Level Setback

Not applicable.

(c) Front Yard Parking Restricted

Not applicable.

(d) Shared Parking in Neighborhood Parking Districts

Not applicable.

(e) Single Story Structures in Shared Use Districts

Not applicable.

(f) Joint Use of Facilities

No joint use of the proposed parking facilities is proposed. **(Affirmative finding)**

(g) Availability of Facilities

The parking to be constructed as part of this development must be for the exclusive use of residents and visitors. It may not be used for the storage or display of vehicles or materials.

(Affirmative finding)

(h) Compact Car Parking

No compact car parking spaces are evident in the project plans. **(Affirmative finding)**

Sec. 8.1.13, Parking for Disabled Persons

Two ADA parking spaces are depicted within the garage. These spaces shall be marked and signed as required for handicap spaces. **(Affirmative finding as conditioned)**

Sec. 8.1.14, Stacked and Tandem Parking Restrictions

Not applicable.

Sec. 8.1.15, Waivers from Parking Requirements/Parking Management Plans

Not applicable.

Sec. 8.2.5, Bicycle Parking Requirements

The project plans contain provision for both short and long term bike parking. Facilities for both are located within the garage. The 43 dwelling units require at least 11 long term bike parking spaces and 4 short term bike parking spaces. As proposed, 16 long term and 8 short term bike parking spaces will be provided. **(Affirmative finding)**

Article 9: Inclusionary and Replacement Housing

Sec. 9.1.5, Applicability

As the proposed development includes more than 5 new dwelling units, it is subject to the inclusionary housing provisions of Article 9. Per Table 9.1.8-1, *Inclusionary Zoning Percentages*, at least 15% of the total unit count must be inclusionary (15% of 43 is 6 dwelling units) in the NMU zone. The percentage of inclusionary units required may increase depending on the rental rates of the apartments. The applicant proposes to provide 6 inclusionary units. Written approval of the inclusionary units by the manager of the city's Housing Trust Fund is required.

(Affirmative finding as conditioned)

Sec. 9.1.12, Additional Density and Other Development Allowances

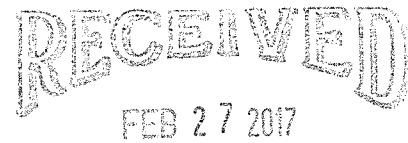
Provision of the required inclusionary housing affords the development an additional 0.5 FAR and 10' building height (set back 10' from the street façade). Additional lot coverage of up to 92% is also enabled. In this case, no additional FAR or lot coverage is sought. An additional 5' of building height is sought. Provision of the required inclusionary housing units entitles the applicants to this additional height. **(Affirmative finding)**

II. Conditions of Approval

Assuming that matters related to traffic impacts are resolved prior to close of the public hearing, the following conditions are recommended.

1. **Prior to release of the zoning permit**, the applicant shall receive written verification of adequate wastewater capacity from the Department of Public Works.
2. **Prior to release of the zoning permit**, all elevation drawings and site plans shall be made consistent (i.e. such as the degree of garage enclosure), subject to staff review and approval.
3. At least **7 days prior to the issuance of a certificate of occupancy**, the applicant shall pay to the Planning & Zoning Department the impact fee as calculated by staff based on the gross square footage of the proposed development.
4. **Prior to release of the zoning permit**, written approval of the inclusionary housing proposal by the manager of the city's Housing Trust Fund shall be obtained.
5. Final approval of the post-construction stormwater management system and the erosion prevention and sediment control plan by the city's stormwater program staff is required.
6. Any and all construction within the public street right-of-way is subject to an encumbrance permit issued by the City Council in conjunction with the Dept. of Public Works.
7. The walkway extending from the Lakeview Terrace sidewalk in front of the proposed building shall be open to the public and shall be maintained by the applicant and/or property owner.
8. The crosswalk at the end of Lakeview Terrace, although on private property, should be installed only following consultation with the Department of Public Works.
9. An intercom system connecting individual dwelling units with the front entry is recommended.
10. Days and hours of construction are limited to Monday – Friday 7:00 AM – 6:00 PM. Saturday construction is limited to interior work only. No construction activity on Sunday.
11. A State of Vermont wastewater permit is required.
12. It is the applicant's responsibility to work with VT DEC to address onsite contaminants noted in DEC's Hazardous Sites List.
13. All new utility lines shall be buried.

14. It is the applicant's responsibility to comply with all applicable ADA requirements.
15. All new construction is required to meet the Guidelines for Energy Efficient Construction pursuant to the requirements of Article VI. Energy Conservation, Section 8 of the City of Burlington Code of Ordinances.
16. Any outdoor signage will require a separate sign permit.
17. Standard Conditions 1-15.



85 North Avenue – Zoning Permit Application Narrative

Description of the Proposed Development and Proposed Use:

DEPARTMENT OF
PLANNING & ZONING

The proposed project will create much needed new housing on a parcel in the Neighborhood Mixed Use zone at 85 North Avenue. The property is a 1.2 acre parcel, or approximately 52,272 square feet of land. The current development intensity represents a FAR (floor area ratio) of only 1.0 in a zoning district that encourages dense mixed-use development of up to 2.0 FAR. Approximately half of the parcel is a paved parking lot with access from both Lakeview Terrace and North Avenue, while the other half consists of a steep forested slope. A portion of the parking lot is controlled through a parking easement by an adjacent property owner.

Per the Burlington Municipal Development Plan, 85 North Avenue is located within the *North Street Commercial District*. The aim of the district, per the Plan, is to 'create a more livable and pedestrian-friendly environment, and restore community pride and vitality in the commercial district. In doing so, the same concept of higher-density, neighborhood-oriented uses envisioned for Neighborhood Activity Center's were applied as a strategy for future development and revitalization of this struggling commercial district'. The project is also located in the *Old North End Enterprise Community*. Per the Plan- 'Neighborhoods immediately north of downtown have suffered neglect and disinvestment over the years. These areas need public and private investment in infrastructure, housing and street amenities to improve their residential and commercial environment. It continues to be a high priority of the City to actively promote redevelopment and investment within the Enterprise Community'.

This project endeavors to continue the ongoing evolution of North Avenue, adding much needed new housing at one of the largest remaining undeveloped sites adjacent to downtown. The project adds density in a mixed-use zone that seeks compact transit/bike/pedestrian oriented development and increases customer base for adjacent local businesses.

The primary use of the new building will be for 43 apartments (anticipated to be 24 efficiency units, 9 one-bedroom units and 10 two-bedroom units) located on the second, third and fourth floors, with full elevator service and common laundry rooms. Indoor bike storage will be accommodated at the ground level with a lockable bike room, while exterior open bike rack storage will be located in the covered parking deck.

The ground floor of the building will be a covered parking deck accessed from the parking lot. The main entrance to the residences will be at the front of the building, facing the parking lot, off a new sidewalk that is a continuation of the Lakeview Terrace sidewalk.

The existing parking lot is completely impervious, with the paving in need of extensive repair. Parking spaces are currently haphazardly striped. The proposed site plan better defines the parking scheme with curbs, islands, planting, lighting and a clear circulation

scheme. Parking lot access from Lakeview Terrace will remain unchanged, while the North Avenue access will be rebuilt and better defined as part of the neighbor's construction project. Green strips of lawn and landscape plantings will be created along the eastern side of the proposed building footprint.

Traffic Generation and Parking Analysis:

The property is located in the shared use parking district within the Neighborhood Mixed-Use District and based on the owners' experience, the close proximity to downtown is expected to attract tenants that are more apt to bike/walk, use public transportation, and use CarShare. The proposed site plan includes a total of 43 off-street parking spaces. Approximately 32 spaces will be constructed on the ground level of the proposed apartment building and 11 spaces are located in an existing surface lot with access to North Avenue and Lakeview Terrace. The parking within the building will be accessed directly from the surface lot, with controlled access.

Under separate cover is a copy of our traffic impact study prepared by Stantec. The traffic analysis considers conditions defined in the recent North Avenue corridor study and concludes that the proposed development will have only a nominal impact on area traffic operations. Peak hour traffic volumes at the North Avenue/North Street intersection, located proximate to the subject site, are expected to increase by less than one percent due to the proposed development. The intersection is expected to operate well below capacity with or without the proposed project.

85 North Avenue Parking Management Plan:

Given the neighborhood mixed use location in close proximity to downtown we are confident the project will attract tenants that are more apt to bike/walk, use public transportation and/or use CarShare. The 43 off-street spaces are sufficient to provide at least one space per apartment, per the Zoning Ordinance requirement. Parking will be made available as an option- and if some tenants choose not to rent the parking space assigned to their unit it may be re-assigned to another tenant who chooses to rent an extra space.

The vehicular access is from North Avenue with traffic entering the site at the curb cut east of the building, and from Lakeview Terrace with traffic entering the site at the curb cut north of the building. The proposed building will have pedestrian and vehicle entries off the parking lot that allow for easy access to the secure bike storage located on the covered ground level. Exterior bike storage will be located under cover in the parking deck.

Phasing and Construction Schedule:

The redevelopment is proposed to occur in a single phase with site work occurring first, immediately followed by construction of the new building, with final utility connections and finish site work including landscaping to occur last. The overall construction schedule is anticipated to take approximately 14 months, with a target start date of Fall 2017 (dependent on zoning approval, Act 250 approval, and issuance of a building permit).

Storm water management:

The project site includes the western half of the existing paved parking lot shared with COTS, and wooded slopes to the west and south. Currently, runoff from the parking lot discharges at 2-3 low areas along its southern edge. There is some evidence of erosion on the bank below.

The COTS project was approved with a stormwater infiltration system that will collect runoff from the northern portion of their half of the parking lot. Runoff from the remainder of the COTS lot and any overflow will continue to flow south, into the area of the proposed building.

City requirements for stormwater management for the proposed site (from the 2016 Technical Review) include infiltration all water from new impervious surfaces and 50% of all other impervious surfaces for up to a one year storm event (to the extent feasible).

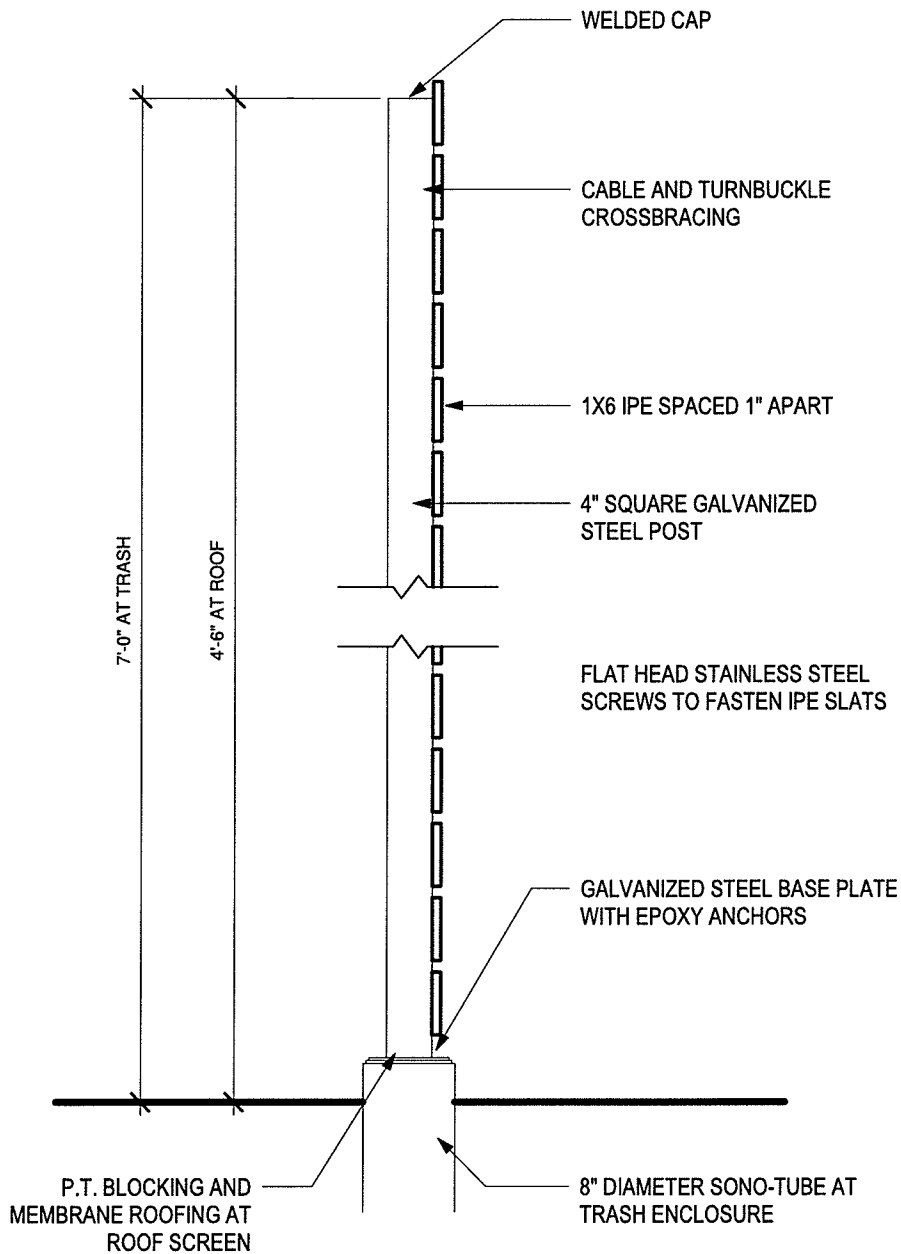
As proposed, the stormwater system for this site will collect all runoff from the project parking lot, pre-treat in a concrete tank, and discharge into an infiltration gallery. Runoff from building roofs will also be collected by the infiltration gallery. This subsurface infiltration system will utilize pre-fabricated stormwater chambers surrounded by an envelope of crushed stone. As currently configured, this system will have capacity to accept and infiltrate the full one year storm volume for both the parking area and building roofs.

Capacity of municipal utilities, services & existing or planned community facilities:

Based on the similarity of the proposed uses to recently approved projects, the stated planning goals of the Neighborhood Mixed Use District and initial feedback obtained from the Technical Review Committee the applicant's understanding is that there is sufficient capacity of municipal utilities, services and existing or planned community facilities to accommodate the proposed new development.

Utilization of renewable energy resources:

The applicant will be working with BED, Vermont Gas and Efficiency Vermont to minimize energy usage in the proposed building through 'VEIC Certified' certification and installation of the most energy efficient available technology for primary space heating and cooling (cold-climate air source heat pumps). The building's design will also provide for future installation of rooftop solar through adequate structural load capacity and conduit run from the utility room to the roof when it becomes economically feasible to do so.



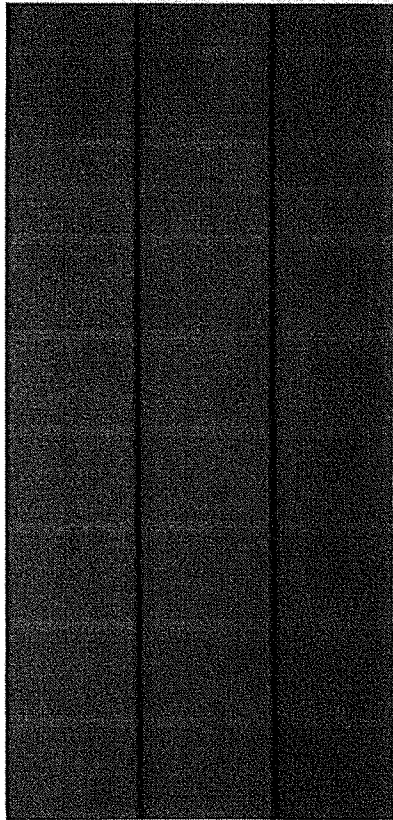
2

WOOD SLAT SCREEN

SCALE: 1" = 1'-0"

- SCREENING AROUND HVAC CONDENSERS AT ROOF
- DUMPSTER ENCLOSURE

Siding	Trim	Soffit	HardieWrap®	Finishing Touches
● HardiePlank® Lap Siding		HardiePanel® Vertical Siding		HardieShingle® Siding



SMOOTH

Countryside Red

Thickness

5/16 in.

Length

12 ft. planks

Width

5.25 in. 6.25 in. 7.25 in. 8.25 in.

Exposure

4 in. 5 in. 6 in. 7 in.

ColorPlus Pcs./Pallet

324 280 252 210

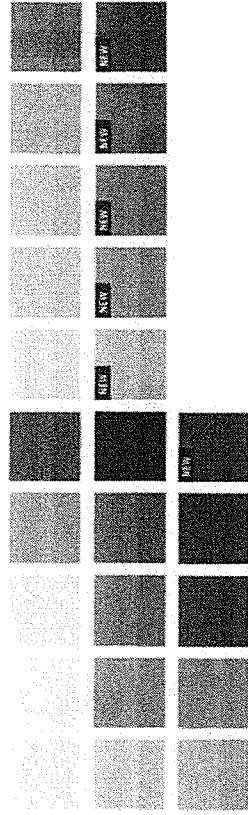
Pine Pcs./Pallet

360 308 252 230

Pcs./Sq.

25.0 20.0 16.7 14.3

Available Colors



Siding Type 1
(color to be selected)

[View all HardiePlank Lap Siding Products](#)

2/23/2017

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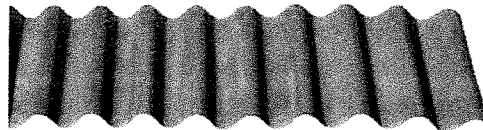
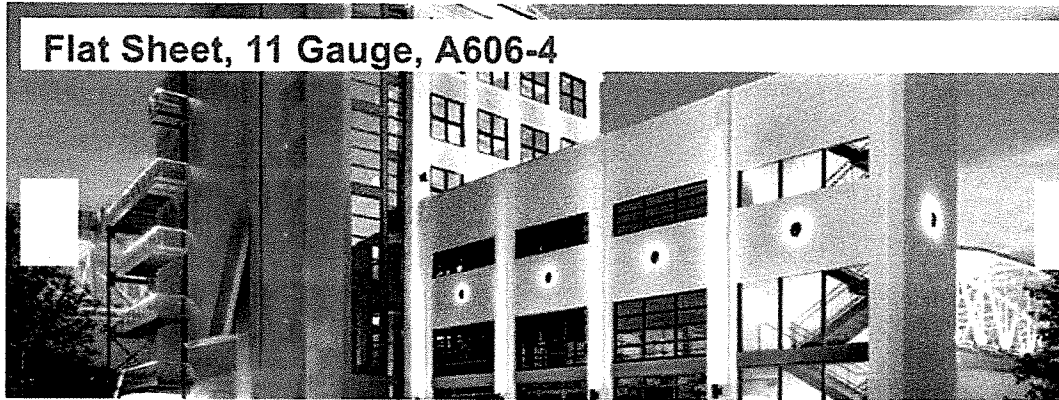


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[LEED INFO](#)

Flat Sheet, 11 Gauge, A606-4

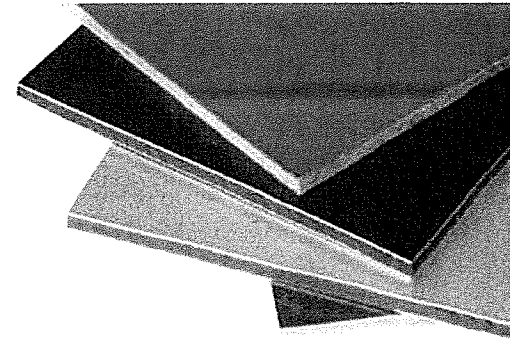


7/8" CORRUGATED

Best Value In A Corten Corrugated Panel. Deep Wavy Corrugations Make This Our Nicest Looking and Most Popular Panel. Available in A606-4 (Aka Corten) Or Bare Steel. Small Or Large Orders.

Siding Type 4
7/8" Corrugated

VENEER/GLAZING™ **TECHNICAL DATA**



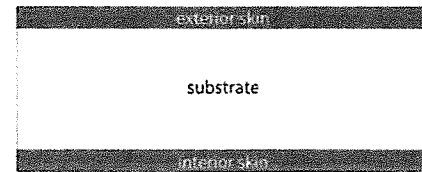
INSTALLATION DETAILS

Standard Veneer Application with Applied Stops or Mapes Molding

- Panel should be sealed interior & exterior with permanently elastic silicone caulking.
- Use setting blocks and drill weeps in sash molding.
- Veneer panels with loose insulation behind them should be back-caulked in conjunction with a minimum 6 mil vapor barrier to eliminate condensation formation.
- Wall cavity should be vented to prevent moisture entrapment.

Important for Both Installation Techniques: A continuous 6 mil vapor barrier is required to prevent condensation within the wall cavity.

TYPICAL CROSS SECTION



CORE OPTIONS

- High density hardboard
- Cement board
- HDPE High Density Polyethylene
- SPS Solid Plastic Substrate

EXTERIOR FINISH GUIDE

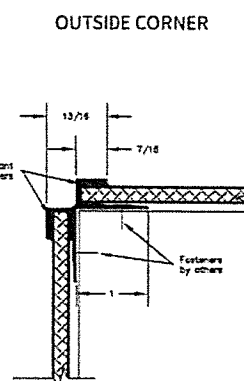
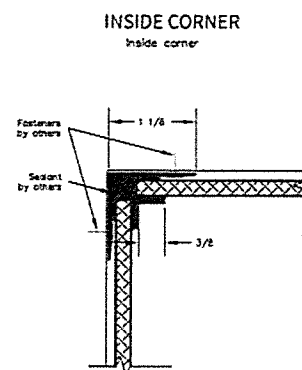
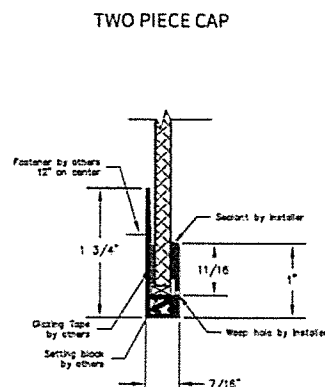
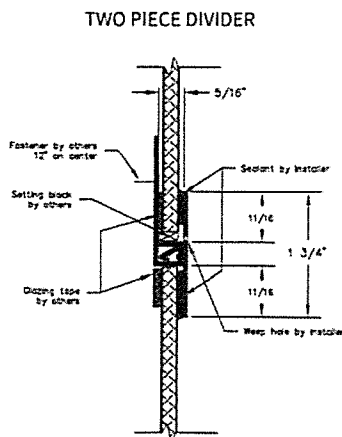
	Embossed	Smooth	Custom Color	Aluminum	Steel	Warranty (yrs)
Porcelain on Steel		X	X*		X	20
Kynar	X	X	X*	X	X	5 to 20
Polyester Baked Enamel	X	X	X*	X		5
Anodized	X*	X	X*	X		n/a
Primed Aluminum	X	X		X		n/a
Galvanized		X			X	n/a
Mill Finish	X	X		X		n/a

*Indicates priming must always consult factory

MOLDING DETAILS

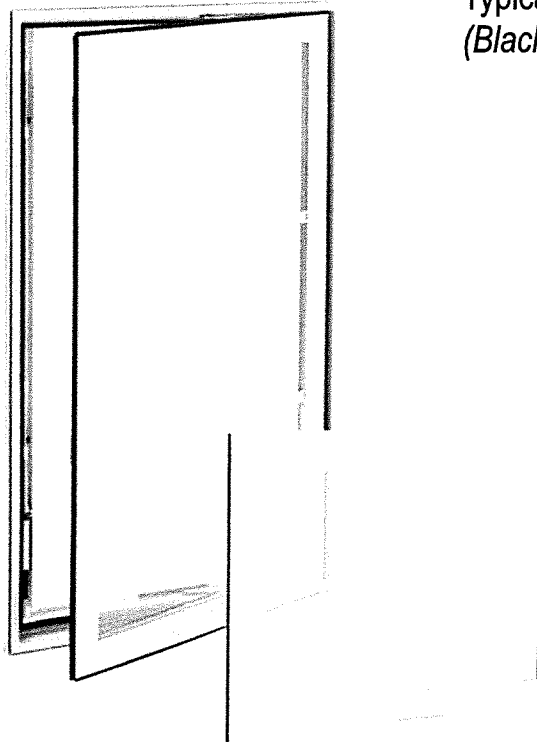
Siding Type 2 Mill Finish Aluminum

Siding Type 3 Charcoal Grey



ALL ULTREX CASEMENT & AWNING

These dynamic windows deliver high end performance with the strength and sustainable characteristics of All Ultrex®. Dual-arm operating hardware and a single lever sequential locking system deliver PG40 performance. A clean design and measured sight lines provide visual depth and a modern classic feel. Six exterior finish colors, five hardware finishes, assorted lite cut configurations, special sizing to 1/64" and available picture and transom units allow for stunning and unique combinations.



Typical Window
(Black Frame Color)

All Ultrex Casement and Awning

STANDARD FEATURES

- Made with Ultrex fiberglass, the first and only AAMA 624-10 verified finish that resists dings and cracks and stays beautiful over time.
- Dual point sequential locking system provides superior PG40 rated performance with single lever operation.
- ENERGY STAR® qualified and available with Low E2 or Low E3 insulated glass.
- Folding handle provides easy operation and neatly stows out of the way of window treatments and blinds – available in five finishes; White, Almond Frost, Brass, Satin Nickel and Oil Rubbed Bronze.
- Interior screen features an extruded aluminum surround and concealed pressure mounting points for ease of operation and enhanced aesthetics.
- Stationary, operating, transom and picture units available.

For more information visit IntegrityWindows.com



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Marvin® brands are dedicated to producing enduring energy-efficient products in ways that will support a sustainable future.

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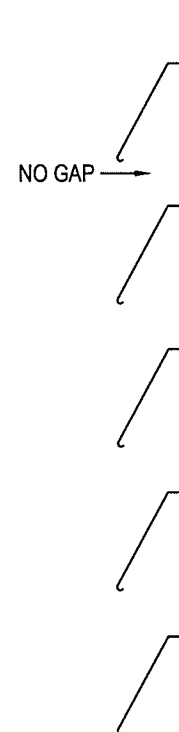
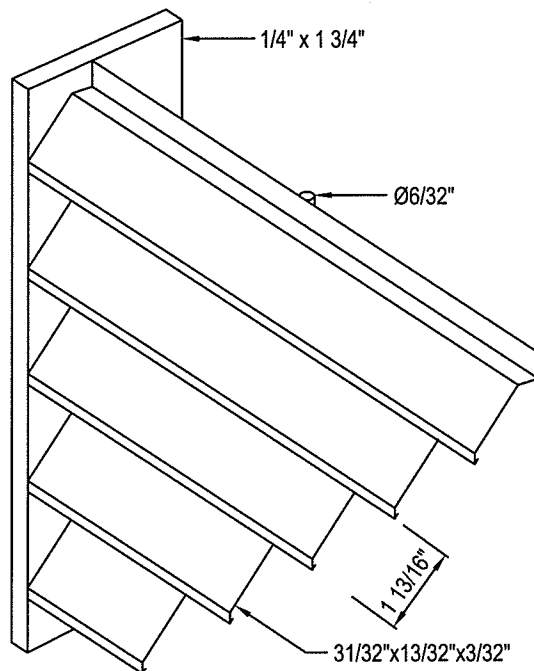
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DIRECT VISUAL SCREENING

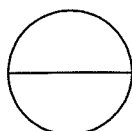
100%



SHADOW DESIGN			
DESIGN	OPEN AREA	VISUAL SCREENING	MAX. LENGTH
SHADOW 100	40.8%	100%	60"

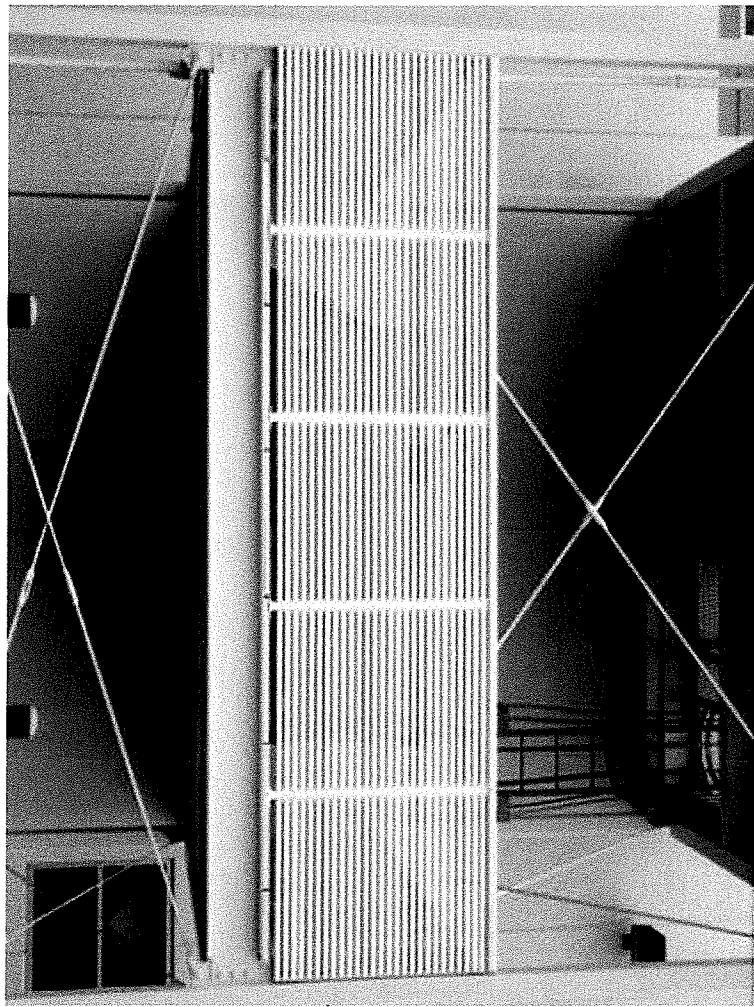
NOTES:

1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.



SHADOW 100 DESIGN

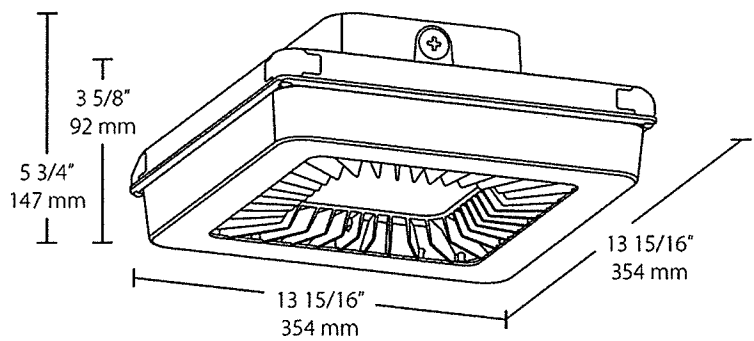
100% DIRECT VISUAL SCREENING



PRT30Y



Dimensions



Features

- Ultra-high efficiency
- Pendant or surface mount
- IP 66 rated, keeps water and dust out
- Low glare, vandal-resistant polycarbonate lens
- 20% uplight eliminates "cave effect"
- 100,000-Hour LED lifespan
- 5-year warranty

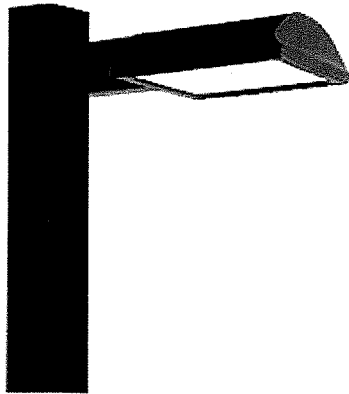
Ordering Matrix

Family	Watts	Color Temp	Finish	Voltage	Dimming
PRT	30	Y			
	30 = 30W	Blank = 5000K (Cool)	Blank = Bronze	Blank = 120-277V	Blank = No Dimming
	42 = 42W	Y = 3000K (Warm)	W = White	/480 = 480V	/D10 = Dimmable
	55 = 55W	N = 4000K (Neutral)			

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DEPARTMENT OF
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ALED3T78Y

RAB
LIGHT



Specification grade area lights available with IES Type III distribution. For use for roadway, general parking and other area lighting applications where a larger pool of lighting is required. Patent pending thermal management system. 5 Year Warranty.

Color: Bronze

Weight: 30.4 lbs

Project:

North Ave Project across from CC

Type:

H

Prepared By:

DGA

Date:

3/14/17

Driver Info

Type:	Constant Current
120V:	0.66A
208V:	0.41A
240V:	0.35A
277V:	0.30A
Input Watts:	79W
Efficiency:	99%

LED Info

Watts:	78W
Color Temp:	3000K
Color Accuracy:	82 CRI
L70 Lifespan:	100000
Lumens:	5,607
Efficacy:	71 LPW

Technical Specifications

Optical

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

BUG Rating:

B1 U0 G2

Replacement:

Replaces 250W Metal Halide.

Construction

IES Classification:

The Type III distribution is ideal for roadway, general parking and other area lighting applications where a larger pool of lighting is required. It is intended to be located near the side of the area, allowing the light to project outward and fill the area.

IP Rating:

Ingress Protection rating of IP66 for dust and water

Ambient Temperature:

Suitable for use in 104° F (40° C) ambient temperatures.

Cold Weather Starting:

Minimum starting temperature is -40° F (-40° C)

Thermal Management:

Superior heat sinking with external Air-Flow fins.

Effective Projected Area:

EPA = 0.75

Housing:

Die cast aluminum housing, lens frame and mounting arm.

Reflector:

Specular vacuum-metallized polycarbonate

Gaskets:

High temperature silicone gaskets.

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Green Technology:

Mercury and UV free. RoHS compliant components. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

For use on LEED Buildings:

IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

LED Characteristics

LEDs:

Six (6) multi-chip, 13W, high-output, long-life LEDs.

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Electrical

Driver:

Constant Current, Class 2, 2000mA, 100-277V, 50-60Hz, 1.1A, Power Factor 99%

THD:

4.4% at 120V, 12.4% at 277V

Surge Protection:

4kV

Surge Protector:

ALED78 is available with a 6kV surge protector (SP6) available.

Listings

IESNA LM-79 & IESNA LM-80 Testing:

RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

Dark Sky Approved:

The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

UL Listing:

Suitable for use as a downlight.

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ALED3T78Y



Technical Specifications (continued)

Listings

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.

DLC Product Code: P0000179T

Other

California Title 24:

See ALED3T78/D10, ALED3T78/BL, ALED3T78/PCS, ALED3T78/PCS2, or ALED3T78/PCT for a 2013 California Title 24 compliant product. Any additional component requirements will be listed in the Title 24 section under technical specifications on the product page.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Patents:

The ALED design is protected by patents in the U.S. Pat. 668,370, Canada Pat. 144956, China ZL201230100154.X, and Mexico Pat. 38423. Pending patents in Taiwan.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

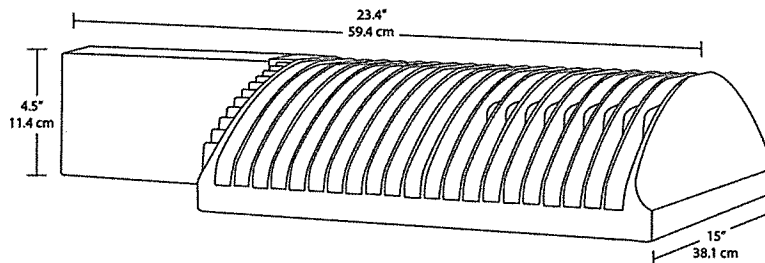
Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.

Dimensions



Features

- 66% energy cost savings vs. HID
- 100,000-hour LED lifespan
- Type III distribution
- 5-year warranty

Ordering Matrix

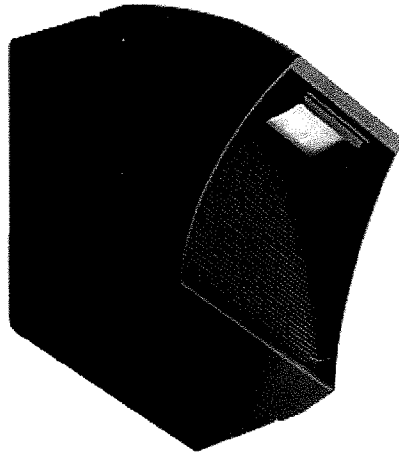
Family	Distribution	Watts	Mount	Color Temp	Finish	Voltage	Photocell	Dimming	Bi-Level
ALED									
	2T = Type II	360 =	Blank =	Blank = 5000K	Blank =	Blank = 120-277V	Blank = No Photocell	Blank = No	Blank =
	3T = Type III	360W	Arm	(Cool)	Bronze	/480 = 480V (Only 360W &	/PC = 120V Button	Dimming	Level
	4T = Type IV	260 =	SF =	Y = 3000K	W = White	260W)	/PC2 = 277V Button	/D10 = Dimmable	/BL = Bi-
		260W	Slipfitter	(Warm)	RG = Gray		/PCS = 120V Swivel		
		150 =		N = 4000K			/PCS2 = 277V Swivel		
		150W		(Neutral)			/PCT = 120-277V		
		125 =					Twistlock		
		125W					/PCS4 = 480V Swivel		
		105 =					/PCT4 = 480V		
		105W					Twistlock		
		78 = 78W							

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PLANNING & ZONING

WPLED5Y

RAB
LIGHT



LED 5W Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 2.0 lbs

Project:

North Ave Project across from CC

Type:

G

Prepared By:

DGA

Date:

3/9/17

Driver Info

Type:	Constant Current
120V:	0.18A
208V:	0.18A
240V:	0.18A
277V:	N/A
Input Watts:	5W
Efficiency:	94%

LED Info

Watts:	5W
Color Temp:	3000K
Color Accuracy:	88 CRI
L70 Lifespan:	100000
Lumens:	128
Efficacy:	24 LPW

Technical Specifications

Listings

UL Listing:

Suitable for wet locations in downlight position only.
Suitable for mounting within 1.2m (4ft) of the ground.

IESNA LM-79 & IESNA LM-80 Testing:

RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

LED Characteristics

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

LEDs:

5W, high-output, long-life LED.

Color Accuracy:

88 CRI

Color Temperature (Nominal CCT):

3000K

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Construction

IP Rating:

Ingress Protection rating of IP66 for dust and water

Ambient Temperature:

Suitable for use in 40°C ambient temperatures.

Cold Weather Starting:

The minimum starting temperature is -40°C/-40°F

Thermal Management:

Integral cast aluminum mounting pad for optimum heat sinking to ensure cool operation with maximum LED life and light output.

Housing:

Precision die cast aluminum housing and mounting plate. 1 1/2" backbox with three 1/2" conduit entry points.

Gaskets:

High temperature silicone gaskets.

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Green Technology:

Mercury and UV free. RoHS compliant components. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

Other

Patents:

The WPLED design is protected by patents pending in the U.S., Canada, China, Taiwan and Mexico.

California Title 24:

See WPLED5/PCS for a 2013 California Title 24 compliant model.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user including coverage of light output, color stability, drive performance and fixture finish.

Country of Origin:

Designed by RAB in New Jersey and assembled in USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.

Equivalency:

Equivalent to 13W CFL or 60W incandescent.

Electrical

Drivers:

Constant current, Class 2, 100 - 240VAC, 50 - 60 Hz
0.18 Amps

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WPLED5Y

Technical Specifications (continued)

Electrical

Surge Protection:

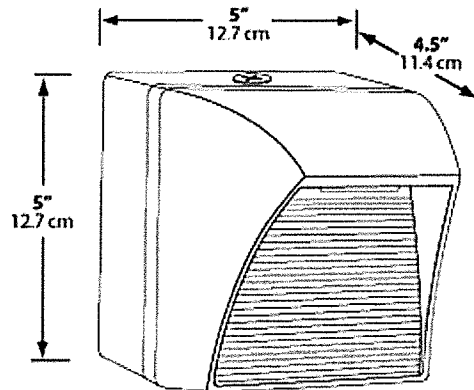
1 KV

Optical

Fixture Efficacy:

24 Lumens per Watt

Dimensions



Features

- High performance LED light engine
- Maintains 70% of initial lumens at 100,000 hours
- Weatherproof high temperature silicone gaskets
- Superior heat sinking with die cast aluminum housing and external fins
- Replaces 13W CFL or 60W Incandescent
- 100 up to 240 Volts
- 5-year warranty

Ordering Matrix

Family	Shape	Watts	Color Temp	Finish	Photocell
WPLED	Blank = Square R = Round	5 = 5W	Blank = 5000K (Cool) Y = 3000K (Warm) N = 4000K (Neutral)	Blank = Bronze W = White	Blank = No Photocell /PCS = 120V Swivel

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PRT30Y

RAB
LIGHT



This ultra high efficiency LED garage light delivers up to 118 lumens per Watt. Available in 30, 42 and 55 Watt versions that replace 70 to 175 Watt metal halide fixtures.

Color: Bronze

Weight: 10.6 lbs

Project:

North Ave Project across from CC

Type:

E

Prepared By:

DGA

Date:

3/9/17

Driver Info

Type:	Constant Current
120V:	0.25A
208V:	0.13A
240V:	0.12A
277V:	0.11A
Input Watts:	29W
Efficiency:	N/A

LED Info

Watts:	30W
Color Temp:	3000K
Color Accuracy:	72 CRI
L70 Lifespan:	100000
Lumens:	3,136
Efficacy:	107 LPW

Technical Specifications

Listings

UL Listing:

Suitable for wet locations.

IESNA LM-79 & LM-80 Testing:

RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80, and have received the Department of Energy "Lighting Facts" label.

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.
DLC Product Code: PKG7WXYN

Electrical

Drivers:

Constant Current, Class 2 100V - 277V, 50/60 Hz. THD <20%.

Construction

Lens:

Frosted polycarbonate

Gaskets:

High temperature silicone.

IP Rating:

Ingress Protection rating of IP66 for dust and water

Ambient Temperature:

Suitable for use in 40°C ambient temperatures.

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Cold Weather Starting:

Minimum starting temperature is -40°F/-40°C.

Thermal Management:

Superior thermal management with external Air-Flow fins.

Housing:

Die-cast aluminum and sheetmetal housing

Mounting:

Die-cast aluminum backbox with (4) 1/2" conduit openings with plugs. Hinged tether for easy installation and wiring. Also accommodates 1/2" or 3/4" NPS pendants (provided by others).

Lens:

High-transmission and vandal-resistant polycarbonate frosted lens

Reflector:

Specular polycarbonate

Green Technology:

Mercury and UV free. RoHS compliant components. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

LED Characteristics

LEDs:

Long-life, high-efficiency surface mount LEDs

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

Color Consistency:

7-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Other

California Title 24:

See PORTO with 0-10V dimming (D10) driver for a compliant California Title 24.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, drive performance and fixture finish.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

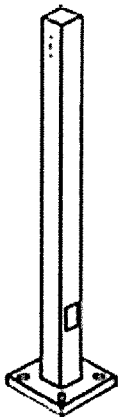
GSA Approved
Suitable in accordance with FAR Subpart

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DEPARTMENT OF
PLANNING & ZONING

PS4-11-20D2



Square steel poles drilled for 2 Area Lights at 180°. Designed for ground mounting. Poles are stocked nationwide for quick shipment. Protective packaging ensures poles arrive at the job site good as new.

Color: Bronze Weight: 137.0 lbs

Project: North Ave Project across from CC	Type:
Prepared By: DGA	Date: 3/9/16

Lamp Info		Ballast Info	
Type:	N/A	Type:	N/A
Watts:	0W	120V:	N/A
Shape/Size:	N/A	208V:	N/A
Base:	N/A	240V:	N/A
ANSI:	N/A	277V:	N/A
Hours:	N/A	Input Watts:	0W
Lamp Lumens:	N/A		
Efficacy:	N/A		

Technical Specifications

Listings
CSA Listed: Suitable for wet locations.
Construction
Shaft: 46,000 p.s.i. minimum yield.
Hand Holes: Reinforced with grounding lug and removable cover.
Base Plates: Slotted base plates 36,000 p.s.i.
Shipping Protection: All poles are shipped in individual corrugated cartons to prevent finish damage.
Color: Bronze powder coating.
Height: 20 FT.

Weight: 137 lbs.
Gauge: 11
Wall Thickness: 1/8".
Shaft Size: 4".
Hand Hole Dimensions: 3" x 5".
Bolt Circle: 8 1/2".
Base Dimension: 8".

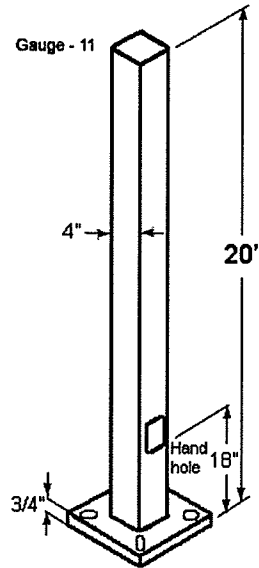
Anchor Bolt: Galvanized anchor bolts and galvanized hardware and anchor bolt template. All bolts have a 3" hook.
Anchor Bolt Templates: WARNING Template must be printed on 11" x 17" sheet for actual size. CHECK SCALE BEFORE USING. Templates shipped with anchor bolts and available .
Pre-Shipped Anchor Bolts: Bolts can be pre-shipped upon request for additional freight charge.
MaxEPA's/Max Weights: 70MPH 8.3 ft_/240 lb 80MPH 5.6 ft_/165 lb 90MPH 3.6 ft_/110 lb 100MPH 2.2 ft_/75 lb 110MPH 1.0 ft_/45 lb 120MPH 0.2 ft_/20 lb.
Other
Terms of Sale: Pole Terms of Sale is available .

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PS4-11-20D2

RAB
LIGHT

Dimensions



Features

Designed for ground mounting

Heavy duty TGIC polyester coating

Reinforced hand holes with grounding lug and removable cover for easy wiring access

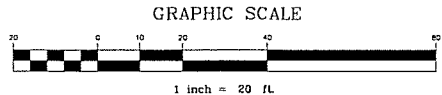
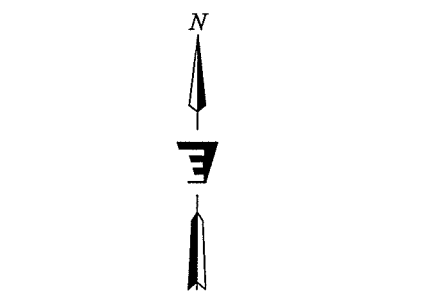
Anchor Bolt Kit includes pole cap and base cover (sold separately)

Custom manufactured for each application

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PLANNING & ZONING



DEMOLITION NOTES

- 1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE MOST RECENT EDITION OF VITRANS STANDARD SPECIFICATIONS FOR CONSTRUCTION, UNLESS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS.
- 2. PARKING ON CITY-OWNED GREENBELTS IS PROHIBITED WITHOUT ADVANCE APPROVAL FROM THE CITY.
- 3. NO DEMOLITION SHALL COMMENCE UNTIL A PRE-CONSTRUCTION MEETING IS HELD WITH THE OWNER AND ALL EROSION PREVENTION AND SEDIMENT CONTROL DEVICES ARE INSTALLED.
- 4. ALL MATERIALS GENERATED BY DEMOLITION, UNLESS NOTED BY THE OWNER TO BE STORED OR REUSED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE PROMPTLY REMOVED FROM THE SITE. EXCESS OR UNSUITABLE SOIL SHALL BE REMOVED FROM THE SITE.
- 5. ALL ADJACENT FACILITIES AND STRUCTURES NOT INDICATED AS INCLUDED IN THE SCOPE OF WORK SHALL BE PROTECTED FROM DAMAGE DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING OR REPLACING ALL ADJACENT FACILITIES OR STRUCTURES DAMAGED DURING CONSTRUCTION TO PRE-CONSTRUCTION CONDITION OR BETTER.
- 6. CONTRACTOR TO PREVENT CONSTRUCTION AREA RUNOFF FROM REACHING THE COTS INFILTRATION SYSTEM.
- 7. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROVIDE A SAFE WORK AREA FOR THE DURATION OF THE PROJECT, INCLUDING INSTALLING AND MAINTAINING CHAINLINK FENCING AROUND ACTIVE WORK AND STAGING AREAS.
- 8. CONTRACTOR SHALL CONTACT DIG-SAFE AND OBTAIN A VALID TICKET PRIOR TO BEGINNING ANY EXCAVATION WORK, IN ACCORDANCE WITH VERMONT STATE LAW.
- 9. PRIOR TO DEMOLITION, HAND EXCAVATE AROUND ANY UNDERGROUND UTILITIES THAT COULD BE IMPACTED BY EXCAVATION WORK. NOTIFY THE OWNER IF ANY OTHER UTILITIES NOT NOTED ON THE DRAWINGS ARE FOUND.
- 10. CARE SHALL BE TAKEN NOT TO DAMAGE OR DISTURB ANY TREES AND SITE LIGHTING NOT INDICATED FOR REMOVAL DURING CONSTRUCTION.
- 11. PROPOSED FEATURES ARE SHOWN ON THIS DRAWING FOR REFERENCE ONLY.
- 12. ALL EXISTING UTILITIES, FENCING AND SITE FEATURES SHOWN WITH CROSS HATCHING (/ / /) ARE TO BE REMOVED (PAVING, GRAVEL, WALLS, WALKS, IRI, CBI, PIPE, ETC).
- 13. SEED AND MULCH ALL RESULTING DISTURBED AREAS IN ACCORDANCE WITH THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN WHERE NO WORK IS ANTICIPATED WITHIN 48 HOURS.
- 14. THE CONTRACTOR MAY NOT HAVE ACCESS TO PERFORM WORK ON THE ENTIRE SITE AT ALL TIMES. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER PRIOR TO BEGINNING WORK IN ANY AREA.
- 15. THE CONTRACTOR SHALL PROVIDE TEMPORARY FENCING AND VEHICLE BARRIERS TO PREVENT ACCESS TO THE WORK AREA BY PERSONS ONSITE TO ACCESS THE FACILITIES OCCUPIED BY THE OWNER.
- 16. REMOVE ALL TEMPORARY AGGREGATE AT THE END OF CONSTRUCTION AND SEED AND MULCH.

DEMOLITION SCHEDULE

- D1 SAW-CUT, REMOVE AND DISPOSE OF EXISTING ASPHALT.
- D2 REMOVE EXISTING CONCRETE CURB.
- D3 REMOVE AND DISPOSE OF EXISTING ELECTRIC CONDUIT, LIGHT POLE AND BASE.
- D4 EXISTING 10" STEEL GAS LINE. COORDINATE RELOCATION WITH VERMONT GAS.

TREE PROTECTION NOTES

- 1. ALL TREES AND SHRUBS EXTENDING TO WITHIN SIX FEET OF DOWNHILL SIDE OF THE BUILDING ARE TO BE REMOVED, UNLESS OTHERWISE INDICATED.
- 2. TREES NOT REMOVED ARE TO BE PROTECTED FROM DAMAGE AND ANY ROOTS OR BRANCHES DAMAGED BY CONSTRUCTION ACTIVITY NEATLY PRUNED.

LEGEND

EXISTING FEATURES	PROPOSED FEATURES
	CATCH BASIN
	BOLLARD
	LIGHT POLE
	UTILITY POWER POLE
	SOIL BORING
	SIGN
	SPOT ELEVATION +100.5
	TREE
	SHRUB
	HANDICAP SYMBOL
	GUARDRAIL
	CONTOUR
	EDGE OF PAVEMENT
	STORM LINE
	SALT FENCE
	TO BE REMOVED
	PAVEMENT REMOVAL AREA

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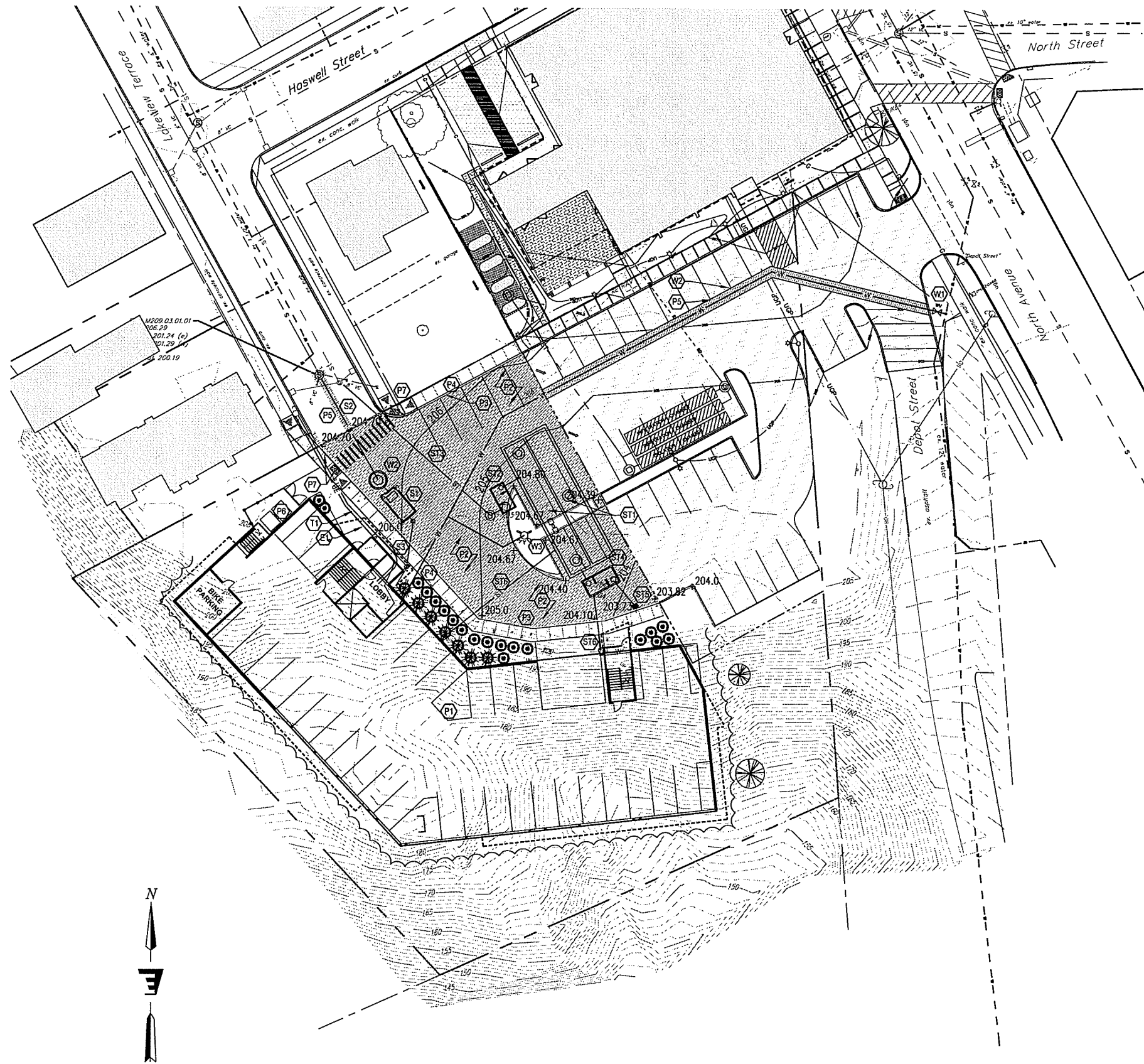
85
North
Avenue
Burlington, Vermont

Revisions:	
Job Number:	0000-00
File Name:	15330 C1.0.dwg
Scale:	As Noted
Date:	February 27, 2017

EXISTING
CONDITIONS
AND
DEMOLITION
PLAN

C1.0

FOR PERMIT REVIEW
NOT FOR CONSTRUCTION
FEBRUARY 27, 2017



LEGEND

EXISTING		PROPOSED
---	100	---
---	100	---
S	SANITARY SEWER LINE	S
ST	STORM LINE	ST
W	WATER LINE	W
UE	UNDERGROUND ELECTRIC	UE
	UNDERGROUND TELECOM	UT
	CATCH BASIN	
	STORM MANHOLE	
	FLARED END SECTION	
	GATE VALVE	
	HYDRANT	
	WATER SHUT OFF	

GENERAL NOTES

- LOCATE AND PROTECT IN PLACE ALL EXISTING UNDERGROUND AND OVERHEAD POWER, TELEPHONE, AND DATA LINES NOT NOTED FOR DEMOLITION.
- COORDINATE ALL WORK NEAR OR ON UTILITIES OWNED BY OTHERS WITH THE UTILITY PROVIDER.
- PROTECT ALL DISTURBED AREAS FROM EROSION IN ACCORDANCE WITH THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN.
- PROTECT ALL TREES AND VEGETATION NOT SLATED FOR REMOVAL.

SITE AND UTILITY NOTES

- P1 NEW BUILDING
- P2 NEW ASPHALT PAVEMENT . SEE DETAIL SHEET C3.3.
- P3 NEW 6" CONCRETE CURB. SEE DETAIL SHEET C3.3.
- P4 NEW CONCRETE SIDEWALK. SEE DETAIL SHT C3.3
- P5 NEW PAVEMENT TRENCH PATCH. SEE DETAIL SHEET C3.3.
- P6 TRASH ENCLOSURE. SEE DETAIL SHEET C3.3.
- P7 NEW CONCRETE SIDEWALK WITH TIP DOWNS, TRUNCATED DOMES AND AND FLUSH CURB. SEE DETAIL SHEET C3.3
- W1 NEW TAPPING VALVE. SEE DETAIL SHEET C3.0.
- W2 NEW 8" DI WATERLINE. SEE DETAIL SHEET C3.0.
- W3 NEW FIRE HYDRANT AND APPURTENANCES. SEE DETAIL SHEET C3.0
- S1 NEW 4,000 GALLON PUMP STATION AND VALVE CHAMBER. SEE DETAIL SHEET C3.1
- S2 NEW 2" PVC FORCEMAIN. SEE DETAIL SHEET C3.1
- S3 NEW 4" BUILDING SEWER AND CLEANOUTS. 2% MINIMUM SLOPE.
- ST1 NEW STORMTEK INFILTRATION CHAMBERS. SEE DETAIL SHEET C3.2
- ST2 NEW 4,000 GALLON STORM WATER OVERFLOW TANK. SEE DETAIL SHEET C3.2.
- ST3 NEW 12" HDPE STORM LINE. SEE DETAIL SHEET C3.2
- ST4 NEW 4,000 GALLON STORMWATER PRE-TREATMENT TANK. SEE DETAIL SHEET C3.2
- ST5 NEW 48" DIA CATCH BASIN. SEE DETAIL SHEET C3.2
- ST6 NEW 8" PVC ROOF DRAIN COLLECTOR. SEE DETAIL SHEET C3.2.
- E1 NEW ELECTRIC CONDUIT. COORDINATE WITH BURLINGTON ELECTRIC DEPARTMENT
- T1 NEW TELECOM CONDUIT. COORDINATE WITH SERVICE PROVIDER.

TOTAL EXISTING LOT COVERAGE		
Total Lot	52,272 sf	100%
Paved Area	21,199 sf	41%
Building Area	0 sf	0%
Total Coverage	21,199 sf	41%
Total Pervious	31,073 sf	59%

TOTAL PROPOSED LOT COVERAGE		
Total Lot	52,272 sf	100%
Paved Area	19,100 sf	37%
Building Area	13,500 sf	26%
Total Coverage	32,600 sf	63%
Total Pervious	19,672 sf	37%

OWNER OF RECORD
Calamoun/Lakeview LLC
210 College St, Suite 201
Burlington, VT 05401

SITE INFORMATION
Zone: Neighborhood Mixed Use
Proposed Dwelling Units: 43

PARKING
Parking District: Shared Use
1 space per unit required
Proposed Parking Spaces: 43
32 Covered
11 Uncovered

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Revisions:
Bldg/Siteplan update 3/10/17
Crosswalks update 4/21/17

Job Number: 0000-00

File Name: 15330 C1.1.dwg

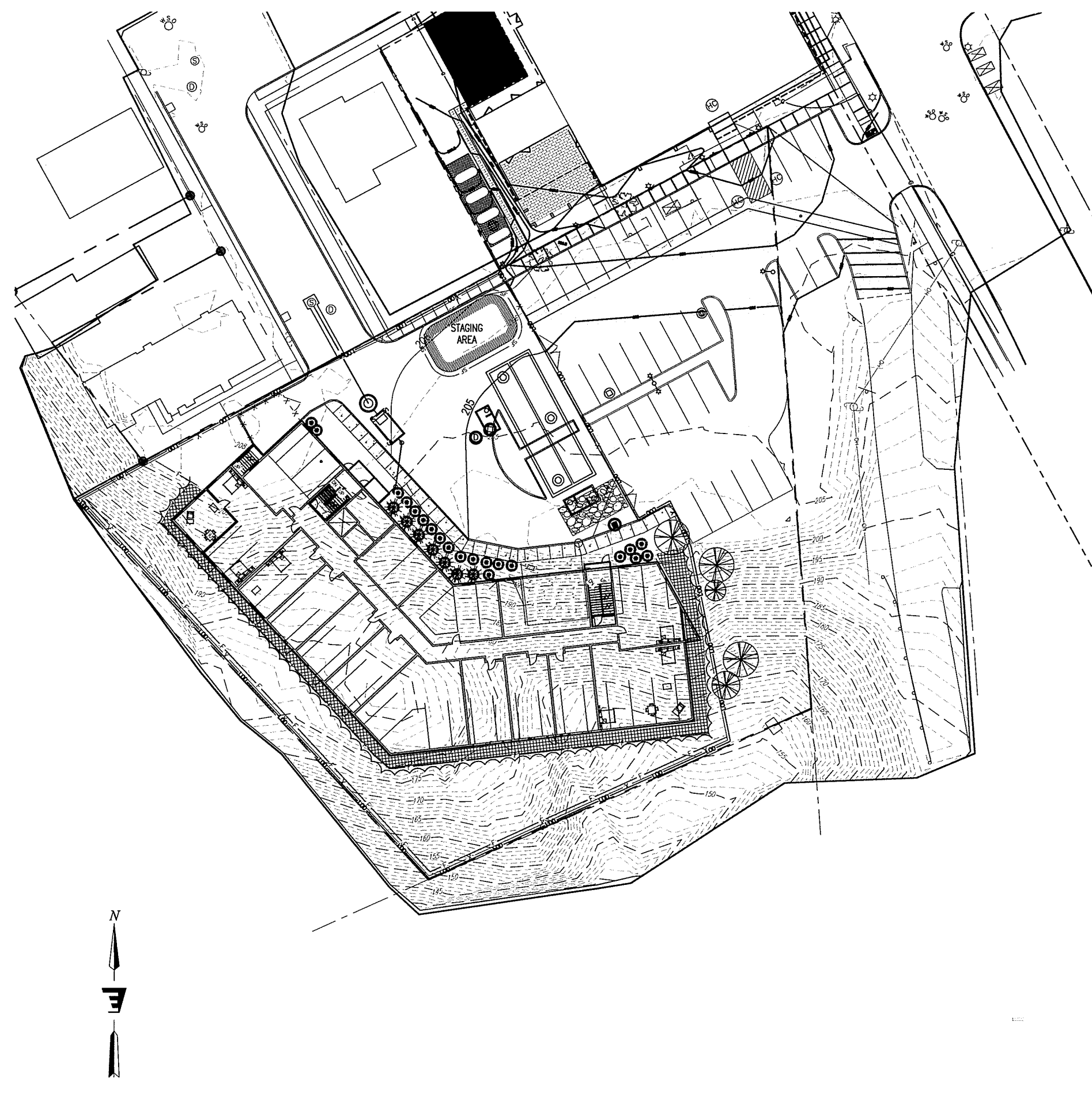
Scale: As Noted

Date: February 27, 2017

GRADING
AND UTILITY
PLAN
(DRAFT)

C1.1

FOR PERMIT REVIEW
NOT FOR CONSTRUCTION
FEBRUARY 27, 2017



GENERAL EROSION CONTROL NOTES

1. THE DISTURBANCE LIMITS INDICATED INCLUDE LESS THAN 1 AC OF SOIL DISTURBANCE AREA, WHICH IS BELOW THE THRESHOLD FOR COVERAGE UNDER VERMONT CONSTRUCTION GENERAL PERMIT 3-9020. THE CONTRACTOR MUST STILL MEET THE "LOW-RISK" REQUIREMENTS OF THAT PERMIT. CHANGES TO THE SCOPE OF WORK OR PROCEDURES OUTLINED ON THIS SHEET ARE TO BE CLEARED WITH THE ENGINEER PRIOR TO IMPLEMENTATION.
2. A PRE-CONSTRUCTION MEETING INCLUDING THE ON-SITE COORDINATOR (OSC), CONTRACTOR, BURLINGTON PUBLIC WORKS DEPARTMENT, AND ENGINEER IS TO BE SCHEDULED BY THE CONTRACTOR AT LEAST ONE WEEK PRIOR TO THE PLANNED START OF CONSTRUCTION. AT LEAST 72 HOURS OF NOTICE TO THE ABOVE PARTIES IS REQUIRED PRIOR TO THE MEETING.
3. A COPY OF THE EPSC PLAN, WITH ALL AMENDMENTS AND ASSOCIATED REPORTS, SHALL BE KEPT ON SITE DURING CONSTRUCTION, AND SHALL BE MADE AVAILABLE TO AUTHORIZED REPRESENTATIVES OF THE CITY OF BURLINGTON UPON REQUEST. THE NOTICE PAGE, PROVIDED BY THE CITY, MUST BE POSTED IN A PUBLICLY VISIBLE LOCATION.
4. DISTURBANCE LIMITS ARE TO BE MARKED, AND THE FOLLOWING MANAGEMENT PRACTICES INSTALLED, PRIOR TO BEGINNING EARTH WORK IN ANY GIVEN AREA: SILT FENCE, CONSTRUCTION ENTRANCE, TREE PROTECTION, CHECK DAMS, AND INLET PROTECTION.
5. THE CONTRACTOR MUST INSPECT ALL BMP'S AND WALK THE SITE PERIMETER AT THE END OF EACH WORKDAY TO ENSURE THAT SEDIMENT WILL NOT LEAVE THE SITE. ANY SEDIMENT FOUND BEYOND THE SITE LIMITS IS TO BE REMOVED IMMEDIATELY.
6. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE "VERMONT HANDBOOK FOR SOIL EROSION AND SEDIMENT CONTROL ON CONSTRUCTION SITES," THE VERMONT GENERAL PERMIT 3-9020 FOR STORMWATER RUNOFF FROM CONSTRUCTION SITES AND BURLINGTON ORDINANCE.
7. ALL DISTURBED AREAS ARE TO BE STABILIZED (TEMPORARY OR FINAL) WITHIN 14 DAYS OF INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE WITHIN THIS WORK AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
 - a. STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN 24 HOURS AND NO LIQUID PRECIPITATION IS FORECAST DURING THAT PERIOD.
 - b. WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2 FEET OR MORE IN DEPTH.
8. THE PERIOD BETWEEN OCTOBER 15TH AND APRIL 15TH IS CONSIDERED THE "WINTER CONSTRUCTION PERIOD". DURING THIS PERIOD, STABILIZATION MUST OCCUR AT THE END OF EACH WORKDAY UNLESS EXCEPTIONS a AND b ABOVE APPLY.
9. ALL DISTURBED AREAS ARE TO BE PERMANENTLY STABILIZED WITHIN 48 HOURS OF FINAL GRADING. THIS WILL INCLUDE WAITING AT A MINIMUM.
10. ALL STABILIZATION INVOLVING SEEDING IS TO BE COMPLETED BY SEPTEMBER 15TH.
11. THE CONTRACTOR SHALL CLEAN ALL EXISTING INLETS AND FLUSH THE EXISTING STORM SEWER SYSTEM AS NEEDED TO PREVENT EXISTING PIPES FROM CLOGGING.
12. THE CONTRACTOR IS RESPONSIBLE FOR DAILY INSPECTION OF THE ADJACENT ROADWAYS FOR OFF-SITE TRACKING OF SOIL MATERIALS. SOIL, STONE, AND DEBRIS FOUND LEAVING THE SITE ARE TO BE REMOVED (WHEN FOUND) BY SWEEPING AT THE END OF EACH CONSTRUCTION DAY, OR MORE FREQUENTLY WHEN NEEDED TO PREVENT IMPACTS TO ADJACENT ROADS AND SIDEWALKS.
13. THE CONTRACTOR IS REQUIRED TO CONTACT THE CITY FOR INSPECTION ONCE FINAL STABILIZATION MEASURES ARE IN PLACE, AND ANOTHER INSPECTION ONCE FINAL STABILIZATION HAS BEEN REACHED (VEGETATED AREAS HAVE GROWN IN).
14. IF DOWATERING IS REQUIRED FOR CONSTRUCTION, THE CONTRACTOR MUST UTILIZE SEDIMENT FILTER BAGS (OR ALTERNATE APPROVED BY THE ENGINEER) TO PREVENT DISCHARGE OF SEDIMENT-LOADED WATER OFF SITE.

EPSC NOTES & LEGEND

DUST CONTROL
DUST SHALL BE CONTROLLED THROUGH APPLICATION OF WATER, AS REQUIRED TO PREVENT MIGRATION BEYOND THE PROJECT LIMITS. CONTROL OF DUST REMAINS AN ONGOING RESPONSIBILITY OF THE CONTRACTOR UNTIL THE SITE IS FULLY STABILIZED.

INSPECTION REQUIREMENTS
THE ON-SITE COORDINATOR (OSC) IS RESPONSIBLE FOR INSPECTION OF ALL EPSC MEASURES EVERY DAY AND AS SOON AS REASONABLY POSSIBLE DURING OR AFTER WEATHER RESULTING IN RUNOFF FROM THE SITE. FULL COMPLIANCE WITH THE REQUIREMENTS OF VERMONT GENERAL PERMIT 3-9020 IS THE RESPONSIBILITY OF THE CONTRACTOR AND OSC. INSPECTION FREQUENCY MAY BE REDUCED TO MONTHLY IF ALL DISTURBED AREAS HAVE BEEN STABILIZED. INSPECTION AND REPORTING REQUIREMENTS DO NOT CEASE UNTIL THE SITE IS PERMANENTLY STABILIZED AND A NOTICE OF TERMINATION HAS BEEN FILED. DISCHARGE OF SEDIMENT AFTER FILING A NOTICE OF TERMINATION IS PROHIBITED.

VEGETATIVE STABILIZATION
ALL SEEDING FOR VEGETATIVE STABILIZATION IS TO TAKE PLACE BETWEEN APRIL 15TH AND SEPTEMBER 15TH UNLESS OTHERWISE APPROVED.

STABILIZATION REQUIREMENTS
TO BE CONSIDERED PERMANENTLY STABILIZED, ALL DISTURBED AREAS MUST BE PROTECTED BY ONE OF THE FOLLOWING: PAVEMENT, GRAVEL, MULCH BEDS, OR VEGETATION (70% MINIMUM COVERAGE). THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL SEDIMENT CONTROL MEASURES (SILT FENCE, DISTURBANCE LIMIT MARKERS, INLET PROTECTION, ETC.) AND FOR RESTORATION OF ALL STAGING AND SOIL STOCKPILE AREAS BEFORE FILING NOTICE OF TERMINATION.

EROSION PREVENTION AND SEDIMENT CONTROL STRATEGY
THE FOLLOWING TECHNIQUES WILL BE UTILIZED AS PART OF A SEDIMENT AND EROSION CONTROL PROGRAM. THE SEDIMENT AND EROSION CONTROL PROGRAM WILL BE IMPLEMENTED IN STAGES. CERTAIN ITEMS FROM ONE STAGE WILL LIKELY OVERLAP OR TAKE PLACE CONCURRENTLY WITH ITEMS FROM OTHER STAGES. REFER TO DETAILS ON SHEET C3.4.

STABILIZED CONSTRUCTION ENTRANCE
THIS STRUCTURAL MEASURE IS A STABILIZED PAD OF AGGREGATE UNDERLAY WITH FILTER FABRIC LOCATED AT ANY POINT WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC RIGHT-OF-WAY, STREET, ALLEY, SIDEWALK, OR PARKING AREA. THE PURPOSE OF A STABILIZED CONSTRUCTION ENTRANCE IS TO REDUCE OR ELIMINATE THE TRACKING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY OR STREETS. THIS WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED.

SILT FENCING
THIS STRUCTURAL MEASURE IS A TEMPORARY BARRIER OF GEOTEXTILE FABRIC USED TO INTERCEPT SEDIMENT LADEN RUNOFF FROM SMALL DRAINAGE AREAS OF DISTURBED SOIL. IT IS INSTALLED ALONG THE PERIMETER OF IMPACTED AREAS AND ALONG THE BASE OF THE FILL SLOPES. ADDITIONALLY, WHEN DESIGNATED ALONG THE LIMITS OF DISTURBANCE, INSTALL CONSTRUCTION FENCE BEHIND THE SILT FENCE. THESE WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED.

FIBER ROLL
THIS STRUCTURAL MEASURE IS A TEMPORARY BARRIER USED TO INTERCEPT SEDIMENT LADEN RUNOFF FROM SMALL DRAINAGE AREAS OF DISTURBED SOIL. IT IS INSTALLED ALONG THE PERIMETER OF IMPACTED AREAS AND ALONG THE BASE OF THE FILL SLOPES. ADDITIONALLY, WHEN DESIGNATED ALONG THE LIMITS OF DISTURBANCE, INSTALL SPECIFIED FENCE BEHIND THE FIBER ROLL. THESE WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED.

APPROXIMATE STAGING AND WASTE AREAS
THESE ARE APPROVED LOCATIONS WHERE NON-SOIL, NON-ERODIBLE MATERIALS MAY BE STORED. SOILS SHALL NOT BE STORED IN THESE AREAS.

LIMITS OF DISTURBANCE
THE CONTRACTOR SHALL CONTAIN ANY EARTH MOVING ACTIVITIES WITHIN THE DESIGNATED LIMITS SHOWN ON THIS PLAN. THE ENGINEER SHALL REVIEW THE SITE TO MAKE ANY ADJUSTMENTS TO ACCOUNT FOR ENVIRONMENTALLY SENSITIVE AREAS, SPECIFIC TREES AND SPECIAL AREAS OF CONCERN. THE LIMITS SHALL BE DEMARKED WITH ORANGE CONSTRUCTION FENCE OR CHAIN LINK FENCE AS SPECIFIED ON PLANS. THESE WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED. CONFIRM LOCATION, EXTENTS AND GATES WITH OWNER. FENCE LOCATION AND GATES TO BE RE-ADJUSTED AS NECESSARY BASED ON CM REQUIREMENTS AND PROJECT PHASING AND COORDINATION.

CHAIN LINK FENCING
CONTRACTOR SHALL INSTALL AS INDICATED ON PLANS AT LIMIT OF DISTURBANCE.

3:1 OR GREATER
THIS STRUCTURAL MEASURE IS INSTALLED IN AREAS THAT HAVE SLOPES OF 3:1 OR GREATER AND OTHER LOCATIONS INDICATED ON THIS PLAN TO STABILIZE THE SLOPE AND REDUCE THE EROSION POTENTIAL. WAITING IS TO BE INSTALLED AND STAPLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION AND MAINTAINED UNTIL VEGETATION IS FULLY ESTABLISHED.

TEMPORARY INLET PROTECTION
INSTALL AS INDICATED ON PLANS. STONE TO BE REMOVED AND REPLACED WITH CLEAN STONE WHEN SEDIMENT REACHES $\leq 1/2$ DEPTH OF STONE. REMOVE ALL SEDIMENT IF COLLECTED IN STRUCTURE AS SOON AS POSSIBLE. FIBER ROLLS MAY BE USED AS AN ALTERNATIVE TO CRUSHED STONE.

FOR PERMIT REVIEW

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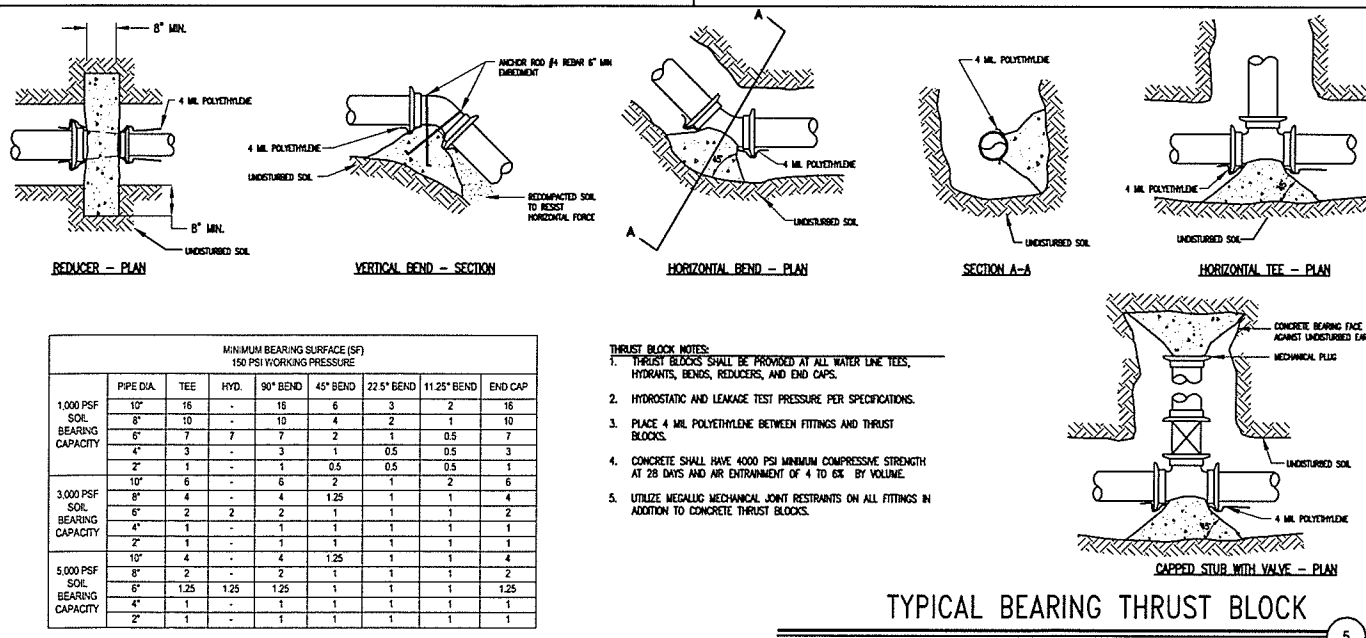
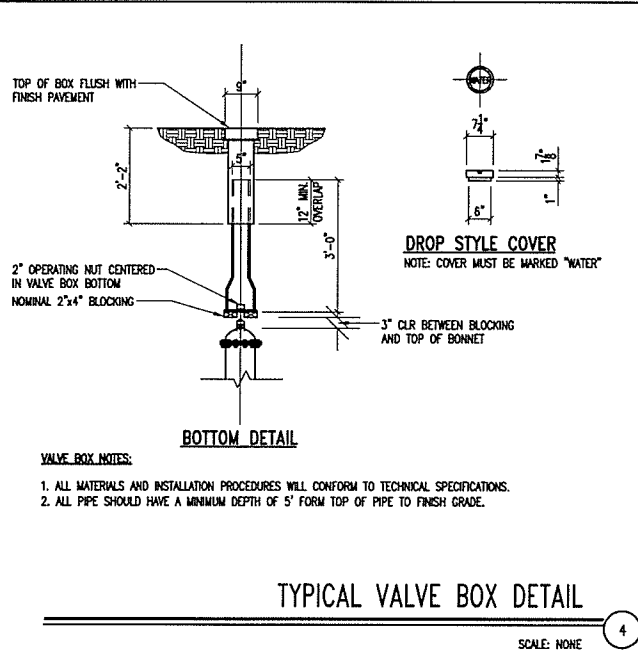
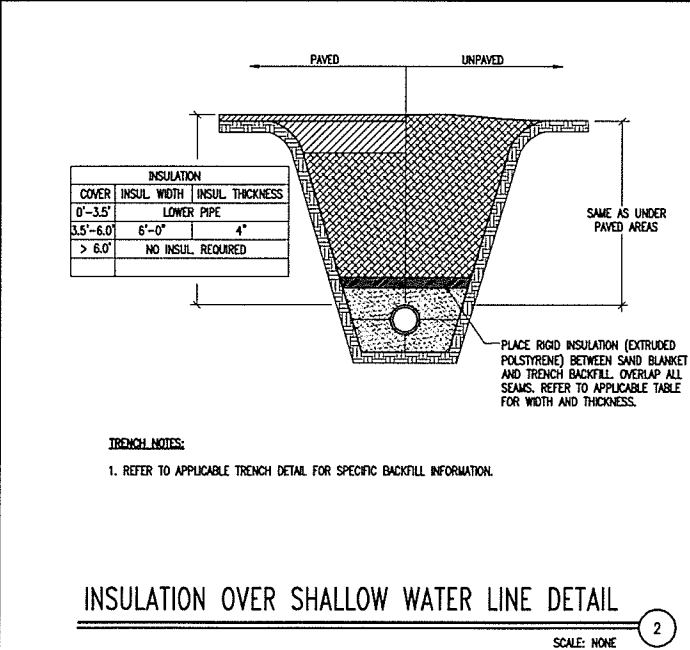
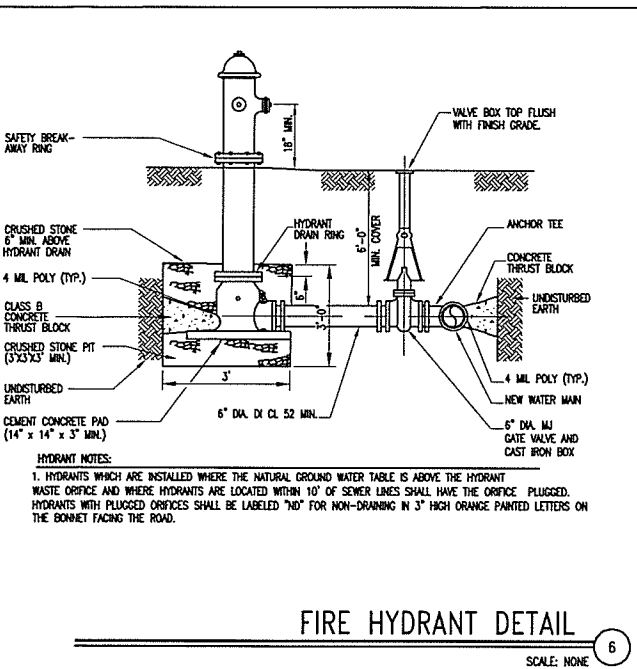
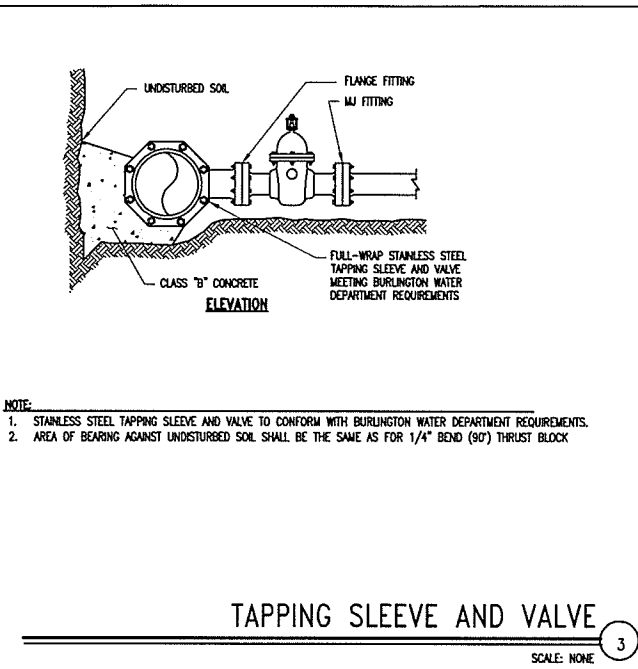
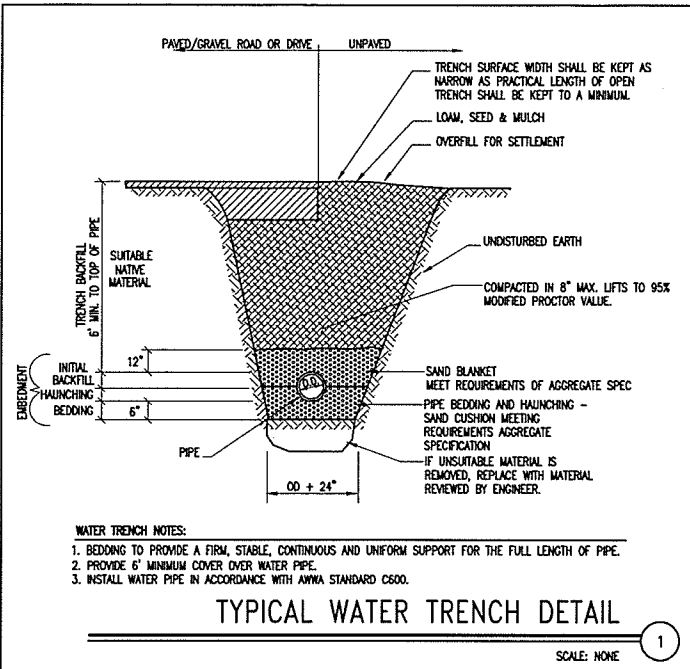
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Revisions:

Job Number: 00000000
File Name: 15330 C1
Scale: As Shown
Date: February 27, 2020

EROSION
PREVENTION
AND SEDIMENT
CONTROL PLAN

C1



WATER NOTES

GENERAL:

- WATER SYSTEM COMPONENTS ARE TO BE LEAD FREE, AND APPROVED BY THE WATER DEPARTMENT.
- WATER INFRASTRUCTURE IS TO INCLUDE SWAGS TIES. "AS BUILT" DRAWINGS SHALL BE PREPARED BY THE CONTRACTOR WHICH REFLECT ACTUAL UTILITY LOCATIONS AND RESULTING EASEMENTS AT THE TIME OF COMPLETION OF THE SYSTEM.
- THE WATER UTILITY SHALL INSPECT ALL ITEMS TO BE TAKEN OVER BY THE TOWN PRIOR TO ACCEPTANCE.
- THE CONTRACTOR SHALL PROVIDE A 2 YEAR WARRANTY ON ALL WATER RELATED ITEMS FROM THE TIME OF COMPLETION OF THE PROJECT.

EXISTING UTILITIES:

- LOCATION OF UTILITIES AND UNDERGROUND STRUCTURES ARE SHOWN AS APPROXIMATE ON THE CONTRACT DOCUMENTS.
- ALL UTILITIES SHALL BE LOCATED BY THE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
- EXISTING UTILITIES SHALL BE PROTECTED AND SUPPORTED DURING CONSTRUCTION.
- 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.

PIPE BEDDING:

- SAND BEDDING MEETING REQUIREMENTS OF EARTHWORK SPECIFICATIONS.
- SAND BLANKET MEETING REQUIREMENTS OF EARTHWORK SPECIFICATIONS.
- TRENCH 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.

WATER MAINS:

- ONCE INSTALLED PERFORM A HYDROSTATIC AND LEAKAGE TEST ACCORDING TO ANMA C600 (LATEST REVISION) ON EACH PIPE LINE.
- 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.
- SPECIFIED TEST PRESSURE IS 200 PSI, AND PRESSURE DURING TEST SHALL NOT VARY BY MORE THAN 5 PSI.

DUCTILE IRON PIPE: ANMA C151

- FITTINGS: DUCTILE IRON, STANDARD THICKNESS, 350 psi PRESSURE RATING. (ANMA C110, C153, C105, ANSI A21.10).
- FITTINGS: CAST IRON, 250 psi PRESSURE RATING (ANSI A21.10).
- JOINTS: MECHANICAL, PUSH-ON AND FLANGED (ANMA C111, C115).
- GASKETS:
 - MECHANICAL AND PUSH-ON JOINTS. ANSI A21.11.
 - FLANGED JOINTS: 1/2" THICK RING OR FULL FACED RUBBER, ANSI A21.15.
- BOLTS/NUTS:
 - MECHANICAL JOINT: ANSI A21.11.
 - FLANGED JOINT: ANSI A21.15.
- MECHANICAL JOINT GLANDS SHALL BE "MEGA-LUG" RETAINER GLANDS.
- LININGS AND LINING REPAIR TO ANMA/ANSI C104.
 - INTERIOR - CEMENT LINED, DOUBLE THICKNESS BITUMINOUS SEAL.
 - EXTERIOR - BITUMINOUS COATING APPROXIMATELY 2 MILS THICK, ANSI A21.15, ANSI A21.15, AND ANSI A21.10.
- FLANGE MACHINED FACE COATINGS: ANSI A21.15.

COOPER TUBING:

- TYPE-K, ANNEALED, ASTM B88.
- FITTINGS: ASME B16.18, CAST COPPER, OR ASME B16.22, WROUGHT COPPER.
- JOINTS: COMPRESSION CONNECTION OR ANS AS8, BOP SILVER BRAZE.
- CHLORINATION OF DOMESTIC WATER LINES.

THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE WATER UTILITY AT LEAST 72 HOURS IN ADVANCE OF BEGINNING ANY DISINFECTION OF WATER MAINS.

- CONTRACTOR SHALL BE RESPONSIBLE FOR BACTERIOLOGICAL TESTING AS REQUIRED BY THIS SPECIFICATION AND REFERENCE STANDARDS MENTIONED.
- DISINFECT ALL NEW PIPELINE SYSTEMS IN ACCORDANCE WITH ANMA C651, INCLUDING:
 - METHOD OF CHLORINE APPLICATION. USE CONTINUOUS FEED METHOD OR SLUG METHOD. (TABLET METHOD IS NOT ACCEPTABLE.)
 - FORM OF CHLORINE UTILIZED.
 - FINAL FLUSHING.
 - BACTERIOLOGICAL TESTING.
 - REpetition OF PROCEDURE.

GATE VALVES:

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

TAPPING VALVES:

- TAPPING VALVES TO MEET ANS/ANMA C509-87, STANDARD FOR RESILIENT SEATED GATE VALVES.
- VALVES SHALL HAVE A MINIMUM WORKING PRESSURE OF 150 PSI.
- VALVES SHALL OPEN RIGHT (CONFORM WITH DPM).
- INLET FLANGES SHALL BE CLASS 125, ANSI B16.1, OR ANS/ANMA C110/A21.10.
- OUTLET CONNECTION: STANDARD MECHANICAL JOINT.
- STEM SEALS: O RING.
- STEM CONSTRUCTION: NON-RISING.
- SEATING: PARALLEL SEAT.
- END CONNECTIONS: MECHANICAL ON RUM, FLANGED ON BRANCH.
- 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" VALVE STEM RISER MADE OF HIGH STRENGTH STEEL SHALL BE PROVIDED. DEPTH FROM VALVE STEM RISER NUT TO GRADE WILL BE 4 TO 6 FEET.

TAPPING SLEEVES:

- ANMA C509, LATEST REVISION.
- ANMA C207, CLASS D, MAX. WORKING PRESSURE OF 150 PSI.
- SLEEVES: SPLIT SLEEVES OF CAST IRON OR DUCTILE IRON.
- MECHANICAL JOINT ENDS WITH END AND GASKET SEALS.
- PROVIDE A 3/4" NPT TEST PLUG OR OTHER PROVISION FOR AIR TESTING THE VALVE AND SLEEVE AT MAXIMUM WORKING PRESSURE.
- BOLTS AND NUTS, MECHANICAL JOINTS: HIGH STRENGTH CAST IRON OR HIGH STRENGTH LOW ALLOY STEEL, ANS/ANMA C111/A21.11-90.
- BOLTS AND NUTS, FLANGED JOINTS: HIGH STRENGTH, LOW CARBON STEEL CONFORMING TO ANS/ANMA C110/A21.10-87, APPENDIX A.
- COAT ALL NUTS AND BOLTS WITH A RUST RESISTANT LUBRICANT.
- ALL BOLTS AND NUTS USED WITH PIPE SLEEVES SHALL BE BRUSH COATED HEAVILY AFTER FINAL TIGHTENING WITH BITUMASTIC COLD-APPLIED MATERIAL TO THOROUGHLY COVER ALL EXPOSED SURFACES OF BOLTS AND NUTS.

VALVE BOXES:

- ACCEPTABLE MANUFACTURERS: MUELLER, CLOW, OR EQUAL.
- CLOW F-2452 SLIDING TYPE, TWO PIECE, OR EQUAL.
- 5 1/4 INCH SHAFT.
- SIZE 664-A (40-60 INCH OVERALL LENGTH).
- CAST IRON.
- CLOW F-2490 LIDS OR EQUAL.
- 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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Revisions:

Job Number:	00
File Name:	C3.
Scale:	A
Date:	February 2

WATER DETAILS AND NOTES

C3.0

FOR PERMIT REVIEW



- ## SANITARY SEWER TRENCH DETAIL

SCALE: NONE



- ### INSULATION OVER SHALLOW SEWER LINE DETAIL

SCALE: NONE



SCALE: NONE



- ELEVATION VIEW OF VALVE CHAMBER



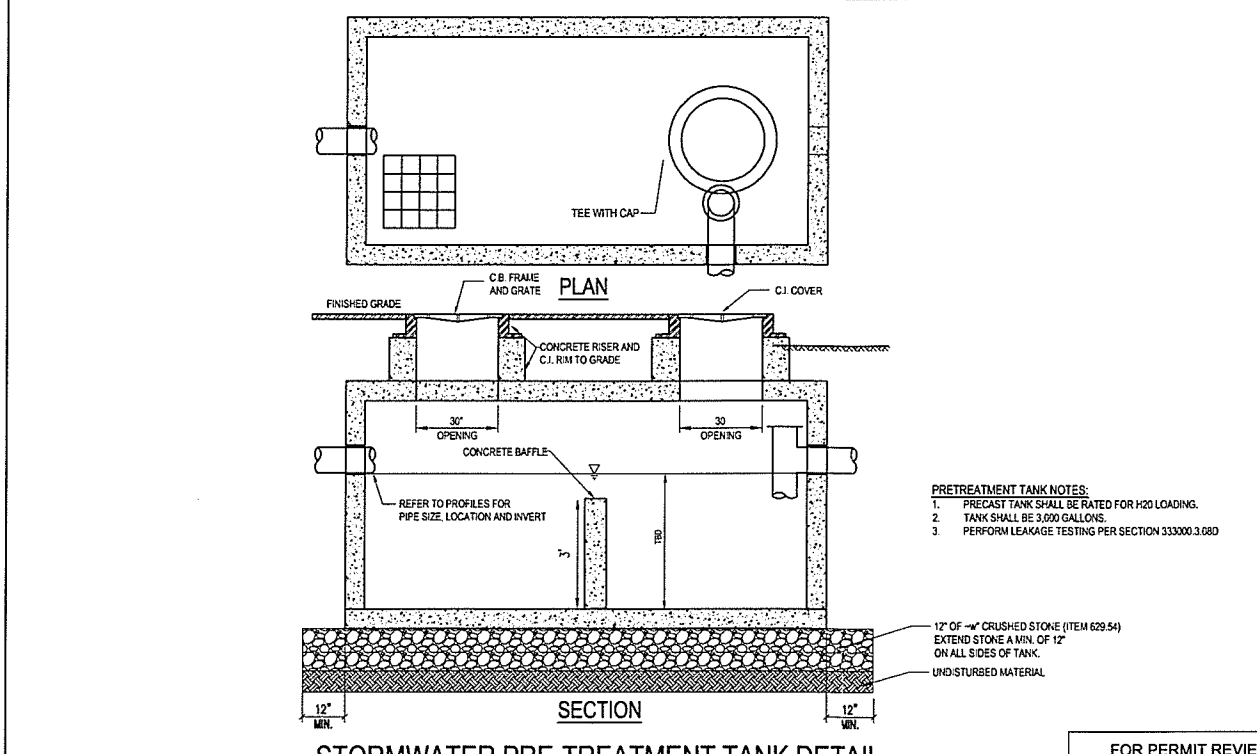
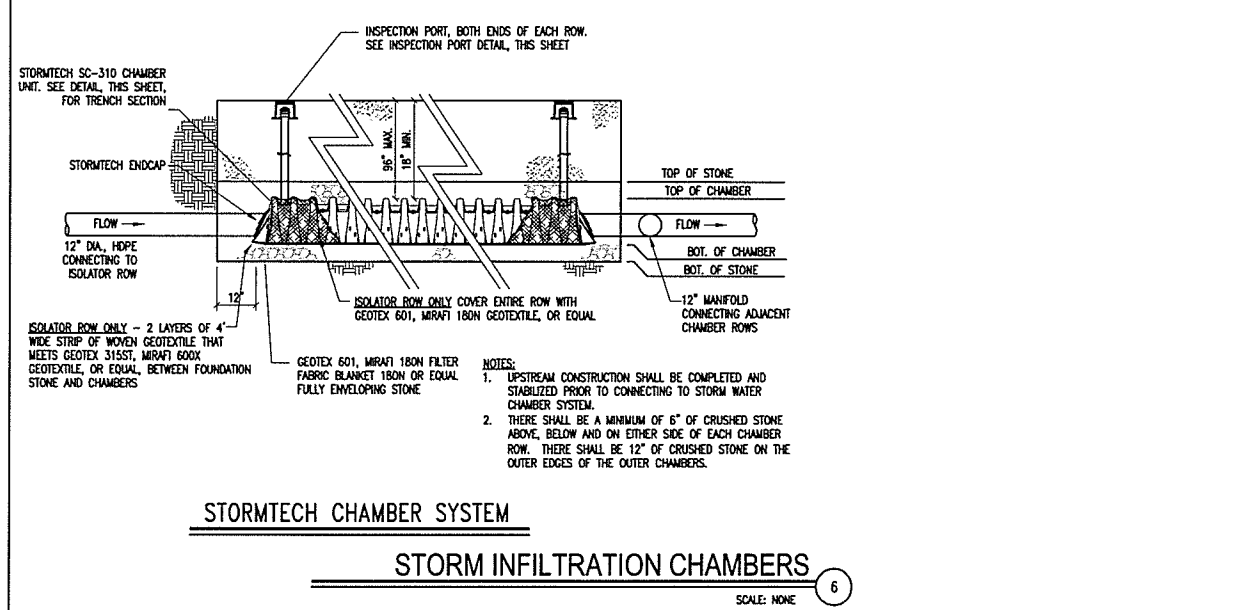
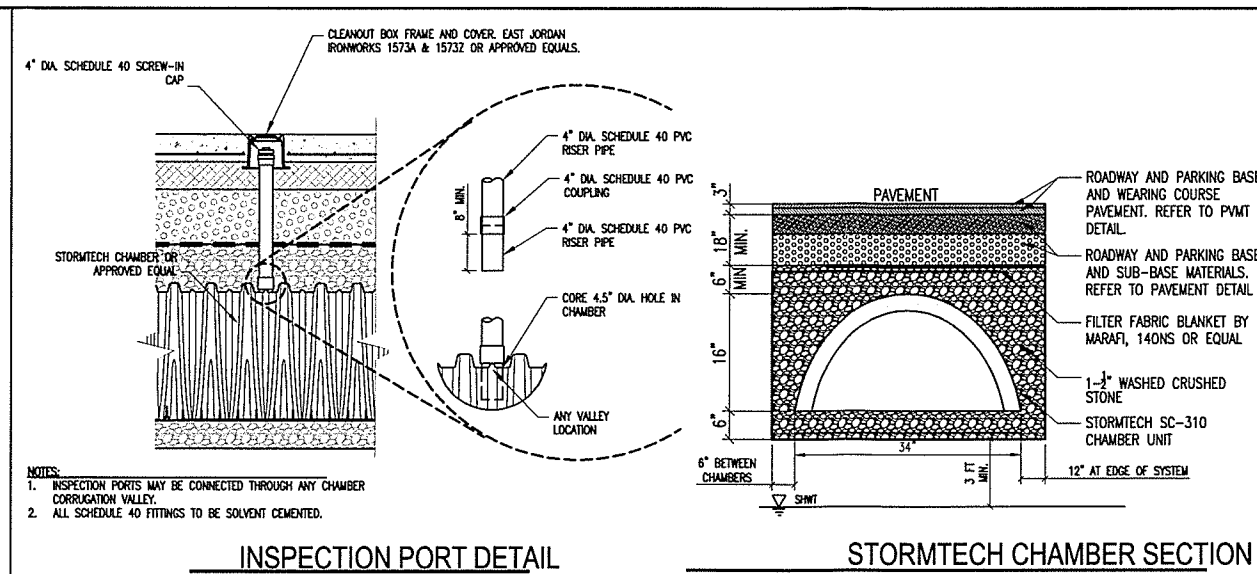
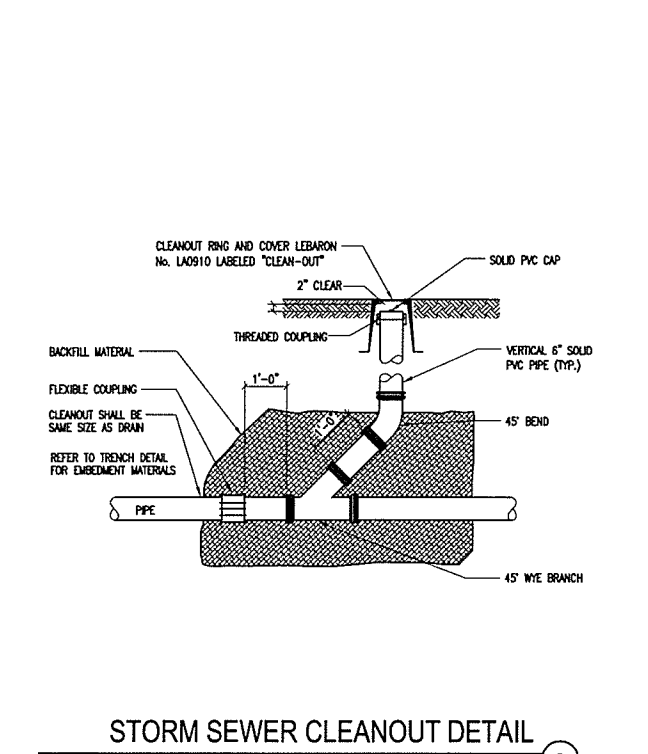
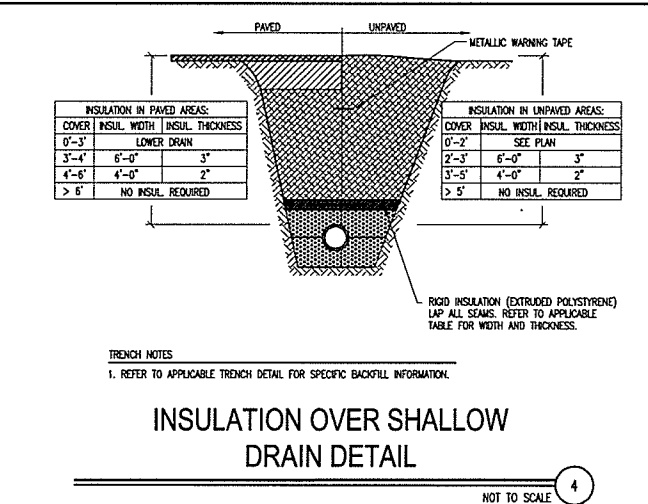
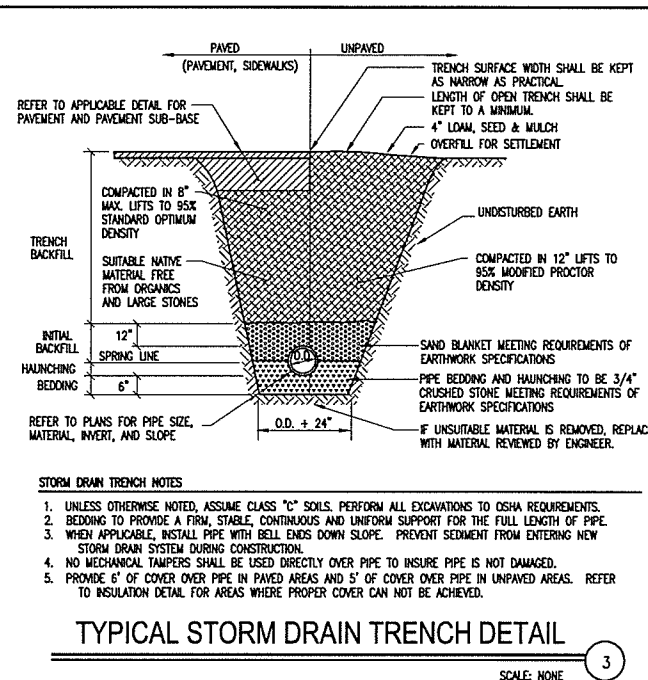
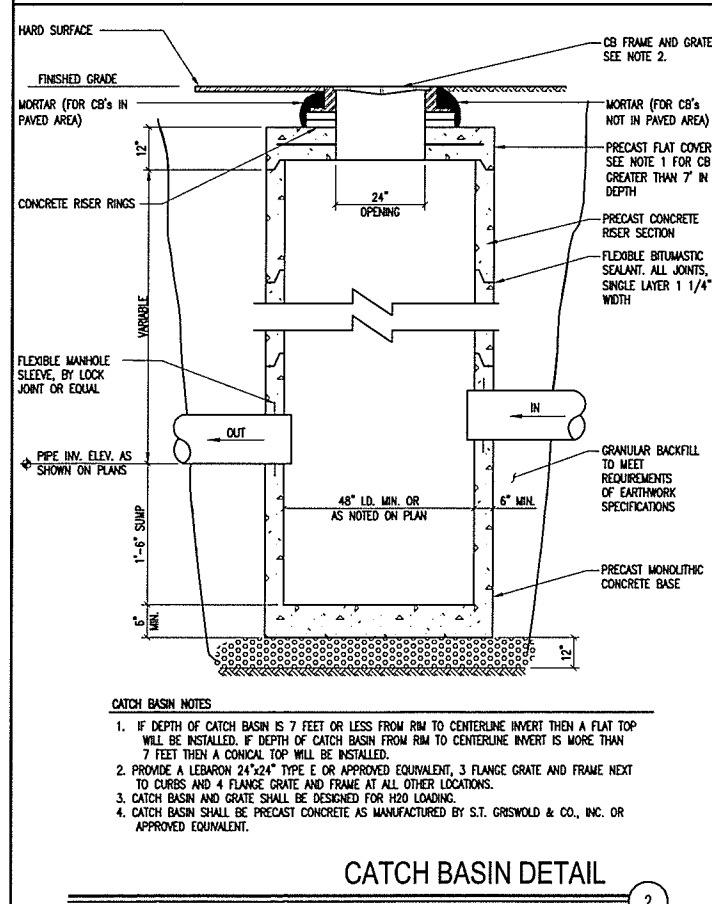
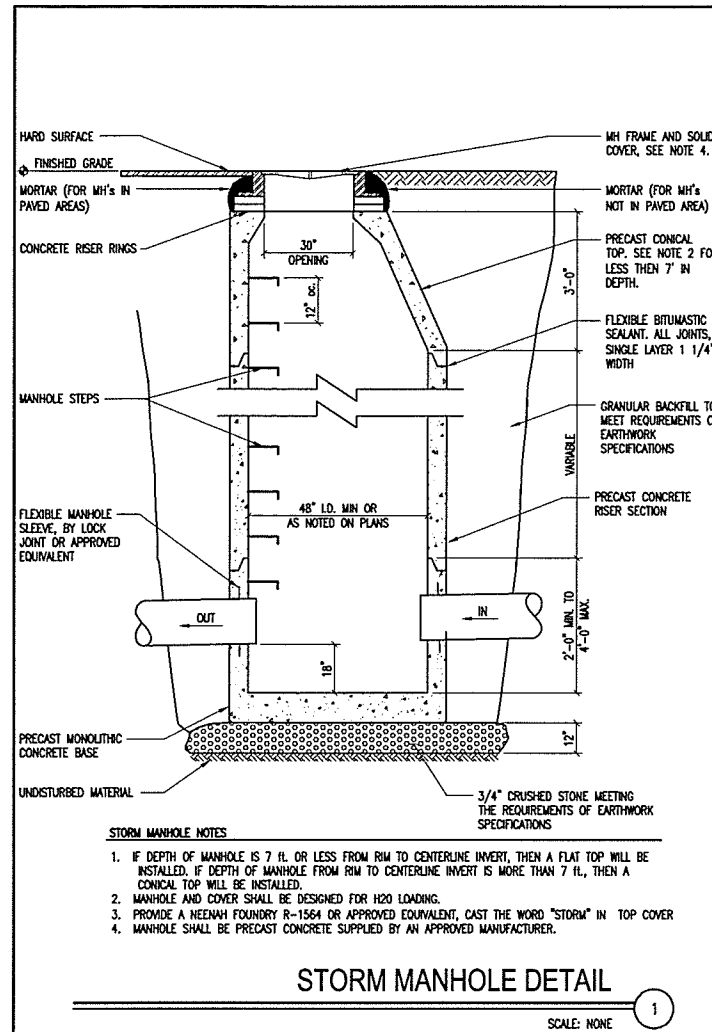
- PUMP STATION NOTES:**

1. ITEMS OF WORK SHALL INCLUDE ALL NECESSARY MATERIALS AND THEIR INSTALLATION AS REQUIRED TO OPERATE THE PUMPING SYSTEM.
2. PUMP STATION SHALL BE REINFORCED CONCRETE. BOTH PUMP STATION AND HATCH RATED TO SUPPORT H2O LOADING.
3. CONTROL PANEL TO BE LOCATED IN THE BUILDING AND SHALL CONTAIN:
 - A. PUMP ALTERNATOR
 - B. RUN LIGHTS
 - C. MANUAL ON/OFF AUTOMATIC CONTROL
 - D. ALARM SILENCE BUTTON
 - E. AUDIO AND VISUAL ALARM TO BE MOUNTED ON THE CONTROL PANEL BOX.
 - F. 120 VOLT RECEPTACLE.
 - G. PROVIDE ONLY AN EXTRA DRY CONTACT FOR A DIAL UP ALARM (A COMPLETE DIAL UP MODEM SHOULD NOT BE INCLUDED).
 - H. PUMP TIMER AND COUNTER SHALL BE AN ELAPSED TIME METER FOR EACH PUMP AND AN EVENT COUNTER TO TRACK SYSTEM CYCLES.
 - I. SEAL FAILURE INDICATORS
 - J. EXTERNAL FLOW CONTROL, STOPPING PUMPS DURING HEAVY RAINFALL EVENTS.
4. LOCATION OF VENT TO BE COORDINATED WITH ARCHITECT AND ENGINEER.
5. SPARE PARTS TO BE SUPPLIED TO INCLUDE:
 - A. EXTRA FLOAT SWITCH
 - B. EXTRA MAGNETIC CONTACTORS.
 - C. TWO ORIGINAL SETS OF MANUALS FOR BOTH THE PUMPS AND CONTROL PANELS.

6. ALL ELECTRICAL COMPONENTS TO BE UNDERWRITERS LABORATORY APPROVED, INSTALLED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
7. ALL PIPE AND FITTINGS IN PUMP STATION SHALL BE FLANGED SCHEDULE 40 PVC.
8. TANK SHALL BE INSTALLED LEVEL ON A COMPACTED 12" GRAVEL BASE.
9. STEPS TO BE COPOLYMER POLYPROPYLENE PLASTIC WITH $\frac{3}{4}$ " GRADE 60 REBAR CONTINUOUS THROUGHOUT.
10. SLIDE RAILS AND DISCONNECT FITTINGS SHALL BE INSTALLED SO THAT THE PUMPS CAN BE REMOVED WITHOUT ENTERING THE PUMP STATION. A STAINLESS STEEL LIFT CHAIN AND REQUIRED MOUNTING HARDWARE WILL BE PROVIDED FOR EACH PUMP WITHIN THE PUMP STATION.
11. THE PUMP CHAMBER AND VALVE PIT SHALL BE FILLED WITH WATER AND SUBJECTED TO A 24 HOUR HYDROSTATIC LEAKAGE TEST. NO LEAKAGE WILL BE ALLOWED DURING THE TEST PERIOD. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A WATERTIGHT STRUCTURE.
12. THE FORCE MAIN LEAKAGE TEST SHALL EXTEND FROM THE RECEIVING MANHOLE INTO THE 1,500 GALLON PUMP CHAMBER INTERIOR.
13. SHOP DRAWINGS OF THE PUMP STATION, VALVE PIT, AND COMPONENTS SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.



SCALE: NONE



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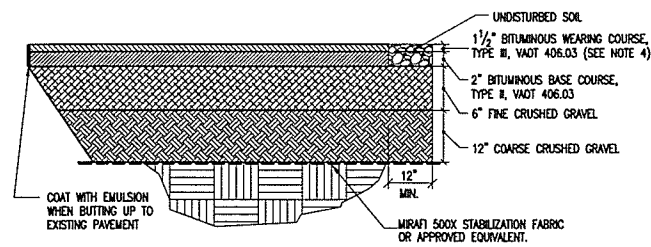
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Revisions:
Job Number: 00
File Name: C3.X
Scale: As
Date: February 27

STORM WATER
DETAILS

C3

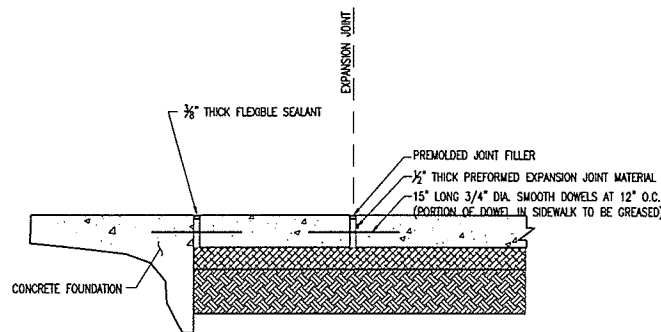


PAVEMENT PATCHING NOTES:

1. IN ALL PAVEMENT AREAS TO BE PATCHED, SAW CUT AND REMOVE EXISTING PAVEMENT.
2. EXCAVATE BASE MATERIAL AND SUB-BASE MATERIAL IF INADEQUATE.
3. COMPACT ALL FILL MATERIAL TO 95% MODIFIED PROCTOR DENSITY.

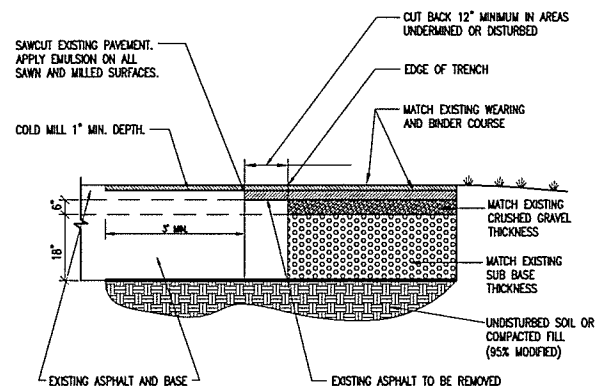
TYPICAL PAVEMENT DETAIL

SCALE: NONE



SIDEWALK DETAIL AT BUILDING

SCALE: NONE

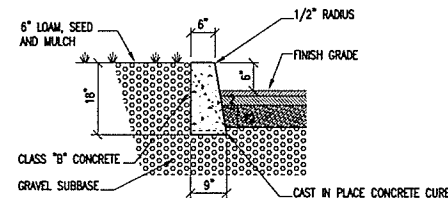


PAVEMENT PATCHING NOTES:

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3. COMPACT ALL FILL MATERIAL TO 95% MODIFIED PROCTOR DENSITY.

PAVING PATCH DETAIL

SCALE: NONE

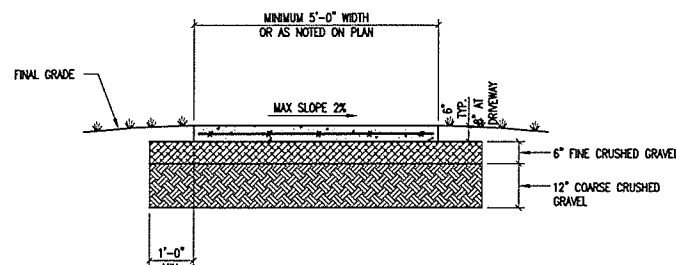


CONCRETE CURB NOTES:

1. CONSTRUCT CURBING IN 10'-0" SECTIONS WITH 1/8" JOINT BETWEEN SECTIONS
2. EXPANSION JOINTS AT 20'-0" O.C., MAX.
3. CONCRETE CURBS SHALL BE CONSTRUCTED IN ACCORDANCE WITH VDOT 616.06.

CONCRETE CURB DETAIL

SCALE: NONE

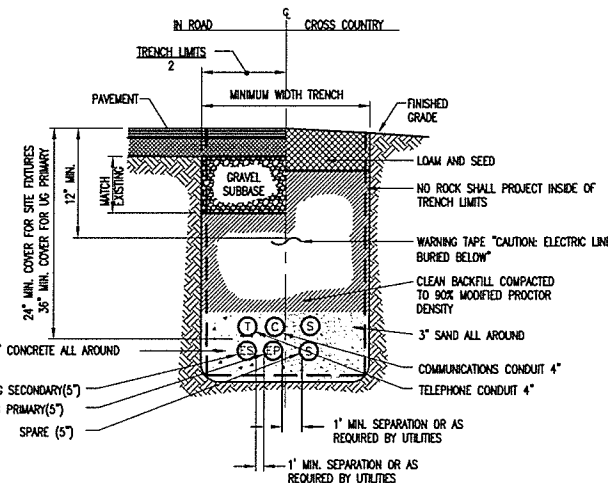


CONCRETE SIDEWALK NOTES:

1. PLACE A TOOLED JOINT 1/8" WIDE AND AT LEAST 1/3 OF THE DEPTH, TYPICALLY AT INTERVALS MATCHING THE SIDEWALK WIDTH, OR AS NOTED ON PLANS (NOT TO EXCEED 10'-0").
2. PLACE EXPANSION JOINT AS INDICATED ON PLANS, NOT TO EXCEED 20'-0" MAX. ALL EXPANSION JOINTS SHALL BE DOWELED WITH A 3" DIAMETER SMOOTH DOWEL AT 12" O.C. DOWEL SHALL BE 15" IN LENGTH AND SHALL HAVE AN EXPANSION CAP INSTALLED AT THE END. SEE DETAIL ON THIS SHEET.
3. BROOM FINISH WITH SMOOTH TROWELED EDGES. TREAT WITH SILANE-SILOXANE OR EQUAL.
4. CAST-IN-PLACE CONCRETE TO BE 4500 PSI CONCRETE, 5X-7X AIR ENTRAINMENT WITH 6X6-W4.0/DW4.0 REINFORCING CENTERED IN SIDEWALK.
5. WHERE SIDEWALK IS ADJACENT TO ENTRY/EXIT DOOR PADS WITH FROST WALL FOUNDATIONS, SIDEWALK SHALL BE DOWELED TO PAD WITH 24" LONG #4 DOWELS (CENTERED) AT 1'-6" OC (PORTION OF DOWEL IN SIDEWALK TO BE GREASED).
6. WHERE SIDEWALK IS ADJACENT TO CURB, BOLLARD OR OTHER HARD FEATURE, INSTALL 1/2" EXPANSION MATERIAL (FULL DEPTH OF SIDEWALK), BETWEEN FEATURE AND SIDEWALK.
7. COMPACT ALL FINE MATERIAL TO 95% MODIFIED PROCTOR DENSITY.

CONCRETE SIDEWALK DETAIL

SCALE: NONE



UNDERGROUND CONDUIT TRENCH

SCALE: NONE

SITE/EARTHWORK SPECIFICATIONS

1. PRIOR TO THE START OF THE WORK, A PRE-CONSTRUCTION MEETING WILL BE HELD WITH THE CONTRACTOR, OWNER, PROJECT ENGINEER AND A REPRESENTATIVE FOR THE CITY OF BURLINGTON TO REVIEW PROCEDURES AND IDENTIFY RESPONSIBILITIES. THE CITY SHALL BE GIVEN NOTICE AT LEAST 24 HOURS PRIOR TO THE MEETING. UNLESS STATED OTHERWISE, ALL MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE STATE OF VERMONT SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. CLEARING AND GRUBBING- ALL TOPSOIL AND UNSUITABLE MATERIALS SHALL BE REMOVED FROM IMPACTED AREAS.
3. COMPACTION SHALL BE PERFORMED USING VIBRATORY ROLLERS AND WATER IN LIFTS OF NO GREATER THAN SIX INCHES. COMPACTION SHALL BE PERFORMED UNTIL THE REQUIRED DENSITY IS ACHIEVED. DENSITY SHALL BE DETERMINED BY AASHTO T238 METHOD AND SHALL NOT BE LESS THAN 95 PERCENT OF THE MAXIMUM DENSITY FOR PAVED AREAS AND 90 PERCENT OF THE MAXIMUM DENSITY FOR NON PAVED AREAS DETERMINED IN ACCORDANCE WITH AASHTO T99.
4. COMPACTION TESTING SHALL BE PERFORMED FOR EVERY LAYER OF MATERIAL PLACED AND FOR EVERY 1000 SQUARE FEET OF AREA.
5. ALL REMAINING DISTURBED AREAS WITHIN THE RIGHT OF WAY SHALL BE TOPSOILED, FERTILIZED AND SEEDDED IN ACCORDANCE WITH THE VERMONT STATE SPECIFICATIONS.
6. THE SEEDING OF SLOPES AND DITCHES SHALL REQUIRE THE USE OF EROSION CONTROL MATTING.

7. COST OF INITIAL INSPECTION AND TESTING SHALL BE PAID BY THE OWNER. SUBSEQUENT TESTING OF MATERIALS NOT PASSING INITIAL INSPECTION, SHALL BE PAID BY THE CONTRACTOR. 8. ALL EARTHWORK MATERIALS SHALL BE OBTAINED FROM APPROVED SOURCES. THEY SHALL CONSIST OF SATISFACTORILY GRADED, FREE DRAINING MATERIAL, REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL. EARTHWORK MATERIALS SHALL MEET THE REQUIREMENTS OF THE FOLLOWING TABLES:

A. SAND BLANKET/BEDDING:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	2 INCHES	100
	1 1/2 INCHES	90 - 100
	1 INCH	70 - 100
	NO. 4	60 - 100
	NO. 10	0 - 20
	NO. 20	0 - 8
B. 3/4" CRUSHED STONE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	1 INCH	100
	3/4 INCHES	90 - 100
	3/8 INCHES	20 - 55
	NO. 4	0 - 10
	NO. 8	0 - 5
C. 1-1/2" CRUSHED STONE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	2 INCH	100
	1-1/2 INCH	95 - 100
	3/4 INCHES	35 - 70
	3/8 INCHES	10 - 30
	NO. 4	0 - 5
D. NO. 57 STONE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	1-1/2 INCHES	100
	1 INCH	95 - 100
	1/2 INCHES	25 - 60
	NO. 4	0 - 10
	NO. 8	0 - 5
E. GRAVEL SUB-BASE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	NO. 4	20 - 60
	NO. 10	0 - 12
	NO. 20	0 - 6
F. COARSE CRUSHED GRAVEL:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	4 INCHES	95 - 100
	NO. 4	25 - 50
	NO. 10	0 - 12
	NO. 20	0 - 6
G. FINE CRUSHED GRAVEL:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	2 INCHES	100
	1 1/2 INCHES	90 - 100
	NO. 4	30 - 60
	NO. 10	0 - 12
	NO. 20	0 - 6
H. GRANULAR BACKFILL:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	3 INCHES	100
	NO. 4	45 - 75
	NO. 10	0 - 12
	NO. 20	0 - 6

- I. TYPE I STONE FOR STONE FILL THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF FOUR INCHES.

- J. TYPE II STONE FOR STONE FILL THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM TWO INCHES TO 36 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 12 INCHES.

Revisions:

Job Number: 00

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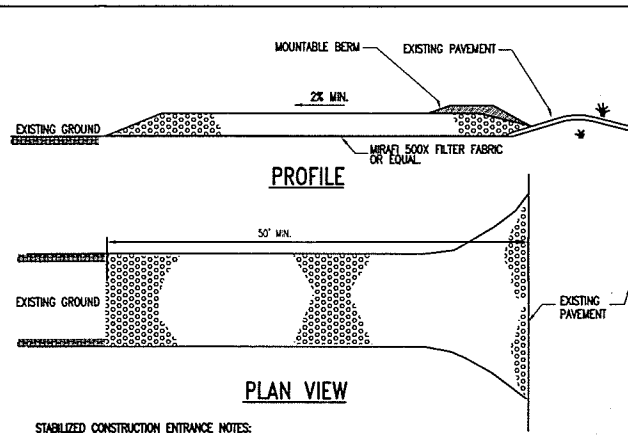
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SITE DETAIL AND NOTES

FOR PERMIT REVIEW

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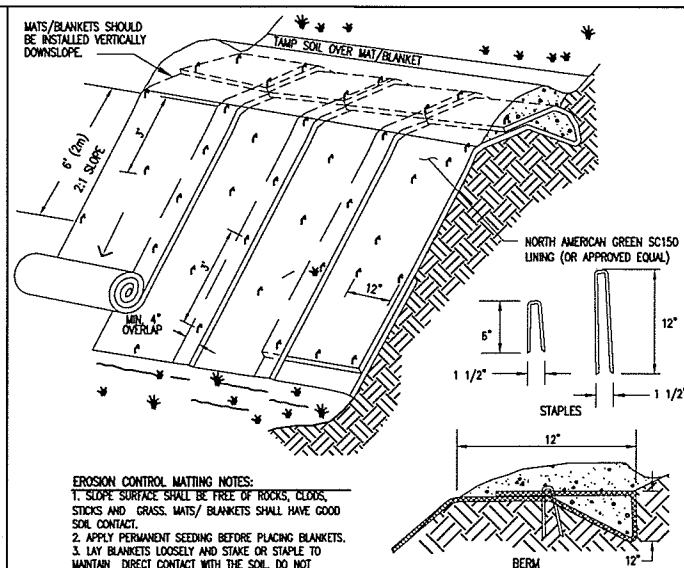


STABILIZED CONSTRUCTION ENTRANCE NOTES:

1. STONE SIZE: USE 1-1/2" CRUSHED STONE.
2. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED ACROSS THE ENTRANCE.
3. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND. REPAIR AND/OR CLEANOUT ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC RIGHT-OF-WAYS MUST BE REMOVED IMMEDIATELY.
4. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
5. WHEELS SHALL BE CLEANED TO REMOVE MUD PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

CONSTRUCTION ENTRANCE DETAIL

SCALE: NONE

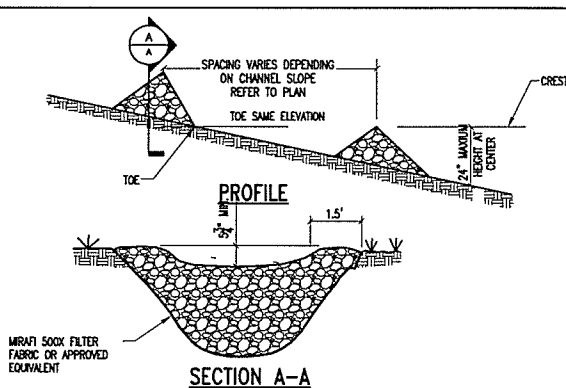


EROSION CONTROL MATTING NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLUMPS, STICKS AND GRASS. MATS/ BANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BANKETS.
3. LAY BANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

EROSION CONTROL MATTING

SCALE: NONE

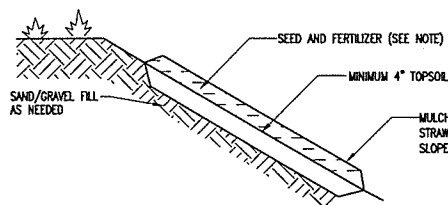


CHECK DAM NOTES

1. TYPE 1 STONE FILL WILL BE PLACED ON A FILTER FABRIC FOUNDATION AT THE GRADES AND LOCATIONS AS DESCRIBED HEREIN, AND TO MEET THE ABOVE DETAIL IN AREAS SHOWN ON PLANS.
2. SET SPACING OF CHECK DAMS SUCH THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM FOR A MINIMUM OF 100' DOWNSTREAM OF DISTURBED EARTH.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED WEEKLY (EVERY 7 DAYS) AND WITHIN 24 HOURS AFTER EACH RAIN.
6. REMOVE SEDIMENT COLLECTED BEHIND EACH DAM WHEN DEPTH OF SEDIMENT IS ONE HALF THE HEIGHT OF THE DAM.

STONE CHECK DAM DETAIL

SCALE: NONE

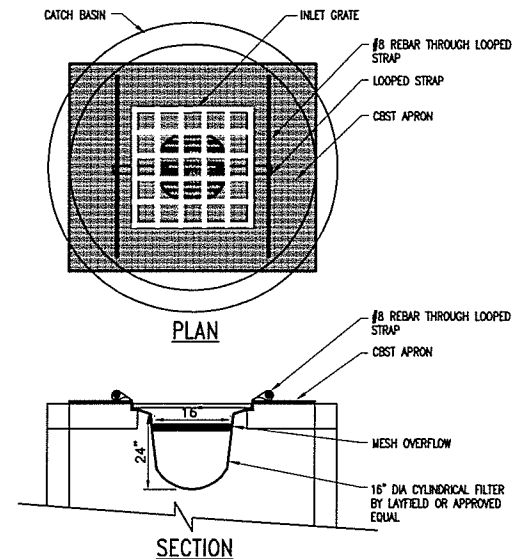


NOTES FOR SEEDING AND MULCHING AREAS

1. ALL DISTURBED SURFACES SHALL BE TEMPORARILY OR PERMANENTLY SEEDING AND MULCHING WITHIN 7 DAYS OF DISTURBANCE.
2. SEEDING AND MULCHING OF DISTURBED AREAS SHALL TAKE PLACE WITHIN 48 HOURS OF FINAL GRADING.
3. MULCH: TYPICALLY HAY OR STRAW MAY BE UTILIZED AND SHALL BE APPLIED AT A RATE OF 90-100 LBS/1,000 SF. MULCH SHALL NOT BE PLACED ON SLOPES OF GREATER THAN 3:1. EROSION CONTROL MATTING SHALL BE USED IN ITS PLACE.
4. SEED: SEEDING SHALL OCCUR AFTER APRIL 15 AND PRIOR TO SEPTEMBER 15TH IN ORDER TO ESTABLISH A STAND OF GRASS PRIOR TO GROUND FREEZING. SEED SHALL BE IN ACCORDANCE WITH SECTION 32 9200.
5. COVER SEED WITH 1/2 INCH SOIL UNLESS A HYDROSEEDER IS USED.
6. MULCH ANCHORING: SHALL BE ACCOMPLISHED BY DEGRADABLE MULCH NETTING. USE WHEN SLOPES ARE GREATER THAN 10%.
7. TOPSOIL AND MULCHING NOT TO BE APPLIED IN AREAS OF TRAVEL WAYS.
8. REFER TO SECTION 32 9200 FOR TOPSOIL AND PERMANENT SEEDING INFORMATION.

SEEDING AND MULCHING AREAS DETAIL

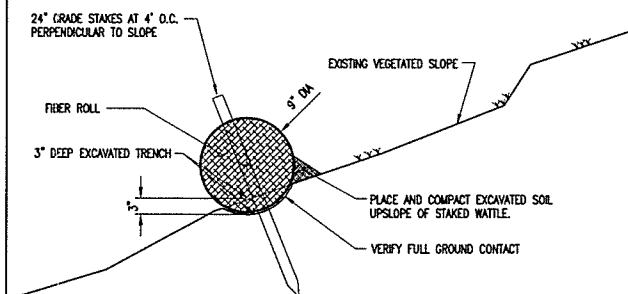
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SECTION

FABRIC INLET PROTECTION

NOT TO SCALE

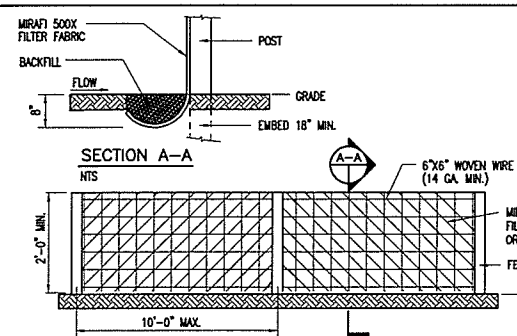


NOTES:

1. FIBER ROLL PRODUCT TO BE NORTH AMERICAN GREEN SEDMAX-SWB9 OR APPROVED EQUIVALENT.
2. ROLLS TO BE 9" DIAMETER AND CONSIST OF AGRICULTURAL STRAW WRAPPED IN BIODEGRADABLE, ORGANIC JUTE NET.
3. INSTALL PER MANUFACTURER'S RECOMMENDATION.

FIBER ROLL DETAIL

NOT TO SCALE

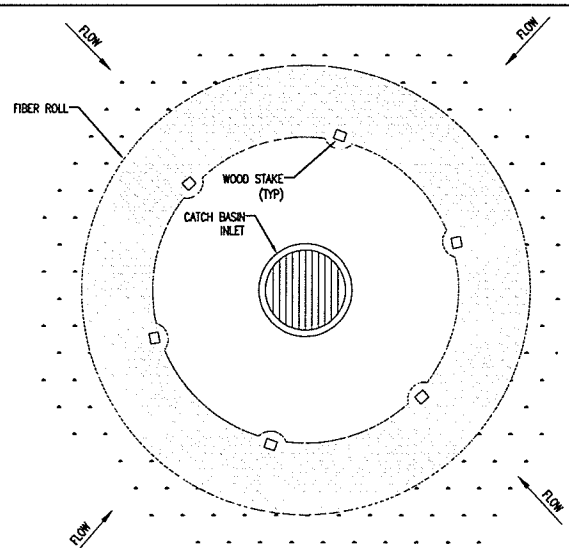


SILT FENCE NOTES:

1. SILT FENCE SHALL BE PRE-FABRICATED EROSION CONTROL FENCE BY MIRAFI OR EQUAL, OR CONSTRUCTED IN PLACE AS SPECIFIED HEREIN.
2. CONSTRUCTED IN PLACE SILT FENCE:
 - A. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
 - B. FILTER FABRIC TO BE FASTENED SECURELY TO WOVEN WIRE FENCE TIES SPACED EVERY 24" AT TOP OF MID SECTION.
 - C. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6", FOLDED AND STAPLED.
3. INSPECTION SHALL BE FREQUENT (MINIMUM ONCE A WEEK AND AFTER EVERY RAINFALL). MAINTENANCE SHALL BE PERFORMED AS NEEDED, AND SEDIMENT REMOVED WHEN "BULGES" DEVELOP IN SILT FENCE.
4. 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



FIBER ROLL INLET PROTECTION DETAIL

SCALE: NONE

EPSC NOTES

1. PRIOR TO THE START OF WORK, A PRE-CONSTRUCTION MEETING WILL BE HELD WITH THE CONTRACTOR, OWNER, PROJECT ENGINEER AND CITY DPW TO REVIEW PROCEDURES AND IDENTIFY RESPONSIBILITIES. 4 WEEKS NOTICE SHALL BE GIVEN TO THE CITY PRIOR TO START OF CONSTRUCTION. UNLESS STATED OTHERWISE STATED, ALL MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE VTTRANS SPECIFICATIONS.
2. ALL REMAINING DISTURBED AREAS SHALL BE FERTILIZED AND SEEDING IN ACCORDANCE WITH APPLICABLE STATE SPECIFICATIONS FOR EROSION CONTROL.
3. THE SEEDING OF 10% OR GREATER SLOPES SHALL REQUIRE THE USE OF EROSION CONTROL MATTING.
4. ALL EARTHWORK MATERIALS SHALL BE OBTAINED FROM APPROVED SOURCES. THEY SHALL CONSIST OF SATISFACTORILY GRADED, FREE DRAINING MATERIAL, REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL. EARTHWORK MATERIALS SHALL MEET THE REQUIREMENTS OF THE FOLLOWING TABLES:

WINTER EROSION CONTROL NOTES

WINTER CONSTRUCTION PROCEDURES

1. DURING WINTER CONSTRUCTION, INSPECTIONS BY THE ON-SITE PLAN COORDINATOR SHALL OCCUR DAILY WHEN AREAS ARE UN-STABLE, AND WEEKLY PRIOR TO ANY FORECASTED RAIN, THAW OR SPRING MELT WHEN TEMPORARY STABILIZATION IS IN PLACE.
2. IN AREAS TO BE STABILIZED BY VEGETATION, ALL SEEDING MUST BE COMPLETED BY SEPTEMBER 15 TO ALLOW GROWTH TO OCCUR PRIOR TO THE GROUND FREEZING. STABILIZATION OF ALL OTHER DISTURBED AREAS SHALL BE COMPLETED BY OCTOBER 15.
3. ENLARGED ACCESS POINTS, STABILIZED TO PROVIDE FOR SNOW STOCKPILING SHALL BE INSTALLED.
4. LIMITS OF DISTURBANCE SHALL BE MOVED OR REPLACED TO REFLECT BOUNDARY OF WINTER WORK.
5. SNOW WILL NOT BE PAILED WITHIN 25 FEET OF PERIMETER CONTROLS (SUCH AS SILT FENCE) TO ALLOW FOR CLEARING AND MAINTENANCE. SNOW IS TO BE REMOVED FROM ALL STRUCTURAL EROSION PREVENTION AND SEDIMENTATION CONTROL MEASURES FOLLOWING EACH SIGNIFICANT SNOWFALL. NO SNOW STORAGE UP-GRADE OF DISTURBANCE. NO SNOW DISPOSAL IN SEDIMENT POND/BASINS. IF NECESSARY, SNOW/ICE MUST BE REMOVED PRIOR TO STABILIZATION OF DISTURBED AREAS. ACCESS POINTS SHALL BE ENLARGED AND STABILIZED TO ALLOW FOR SNOW STOCKPILING.
6. IN AREAS OF DISTURBANCE WITHIN 100 FT OF A RECEIVING WATER, SILT FENCE SHALL BE REINFORCED OR ELSE REPLACED WITH PERIMETER DIKES, SWALES OR OTHER PRACTICES RESISTANT TO THE FORCES OF SNOW LOADS.
7. DRAINAGE STRUCTURES SHALL BE KEPT OPEN AND FREE OF SNOW AND ICE DAMS.
8. ALL EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE BY OCTOBER 15, OR IF NOT POSSIBLE, THEN PRIOR TO GROUND FREEZE.
9. MULCH IS TO BE APPLIED AT THE END OF EACH WORKDAY TO ALL EXPOSED AREAS THAT HAVE NOT YET REACHED FINAL GRADE AT TWICE THE RATE INDICATED IN THE SEEDING AND MULCHING DETAIL FOR THE REGULAR CONSTRUCTION SEASON. MULCH SHALL BE TRACKED IN OR STABILIZED WITH NETTING.
10. TO ENSURE COVER OF DISTURBED SOIL IN ADVANCE OF A MELT EVENT, AREAS OF DISTURBED SOIL MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
 - A) IF NO PRECIPITATION WITHIN 24 HOURS IS FORECAST AND WORK WILL RESUME IN THE SAME DISTURBED AREA WITHIN 24 HOURS, DAILY STABILIZATION IS NOT NECESSARY.
 - B) DISTURBED AREAS THAT COLLECT AND RETAIN RUNOFF, SUCH AS HOUSE FOUNDATIONS OR OPEN UTILITY TRENCHES.
11. SNOW AND ICE SHALL BE REMOVED TO LESS THAN 1" THICKNESS PRIOR TO STABILIZATION.
12. STONE STABILIZATION, 10 TO 20 FT WIDE IN AREAS SUCH AS THE PERIMETER OF BUILDINGS UNDER CONSTRUCTION WHERE CONSTRUCTION VEHICLE TRAFFIC IS ANTICIPATED SHALL BE INSTALLED.

gb
gossens.bachman.Architects
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montpelier, vt 05602
802.229.1664
802.229.4822 FAX
www.gbarchitecture.com

85
North
Avenue
Burlington, Vermont

Revisions:

Job Number:

File Name:

Scale:

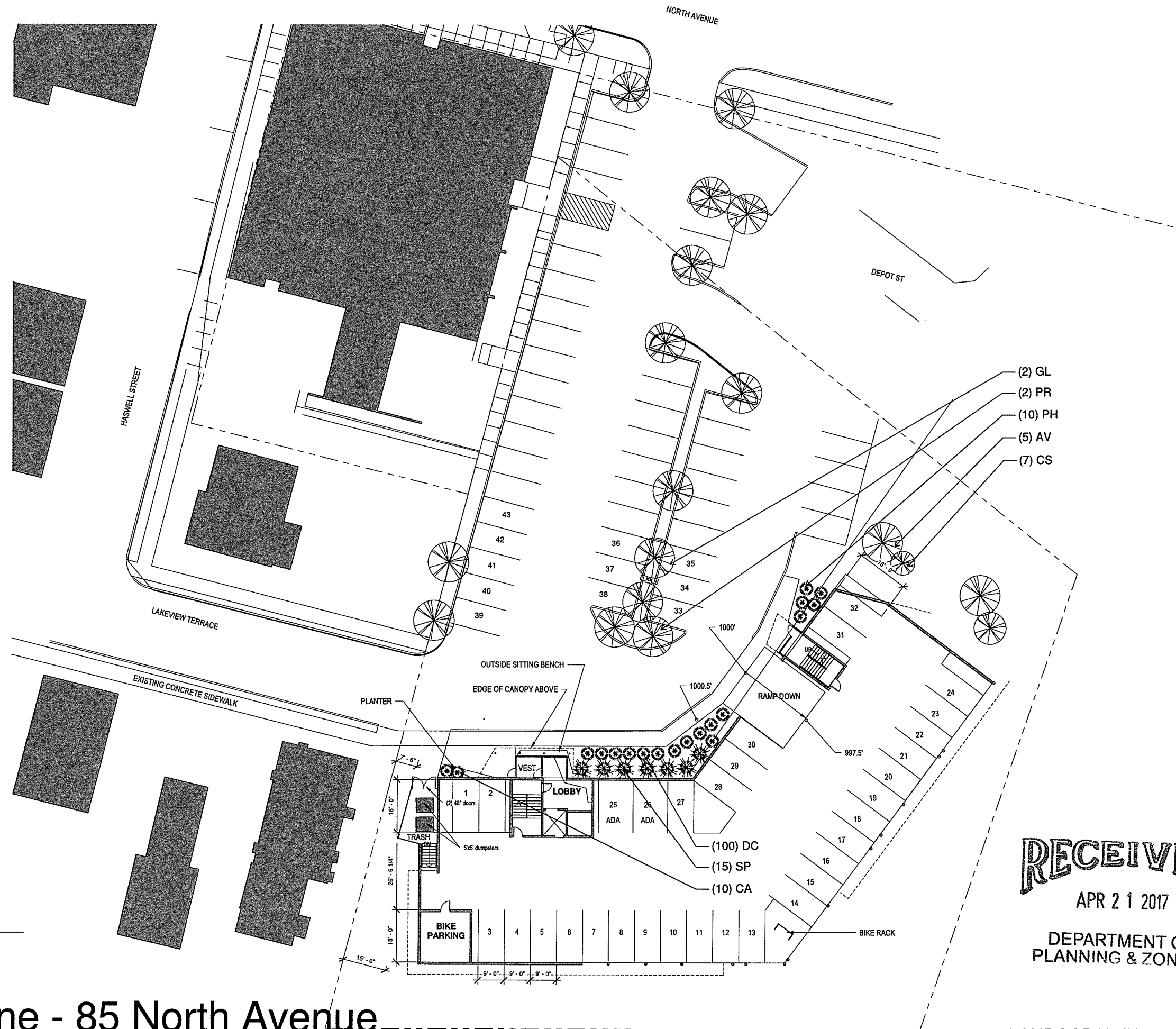
Date:

EROSION
PREVENTION AND
SEDIMENT CONTROL
DETAILS

C3.4

FOR PERMIT REVIEW
NOT FOR CONSTRUCTION

KEY	SCIENTIFIC NAME	COMMON NAME	SIZE
PR	ULMUS AMERICANA	PRINCETON	5" - 6"
GL	GLEDITSIA	SHADEMASTER	5" - 6"
CA	CALAMAGROSTIS	KARL FOERSTER	2 GAL
SP	SYRINGA PATULA	MISS KIM	5 GAL
DC	DESCHAMPSIA CESPITOSA	PIXIE FOUNTAIN	1 GAL
PH	PHYSOCARPUS	LITTLE DEVIL	3 GAL
AV	AMELANCHIER	AUTUMN BRILLIANCE	6-8'
CS	CORNUS STOLONIFERA	ALLEMAN COMPACT	3 GAL

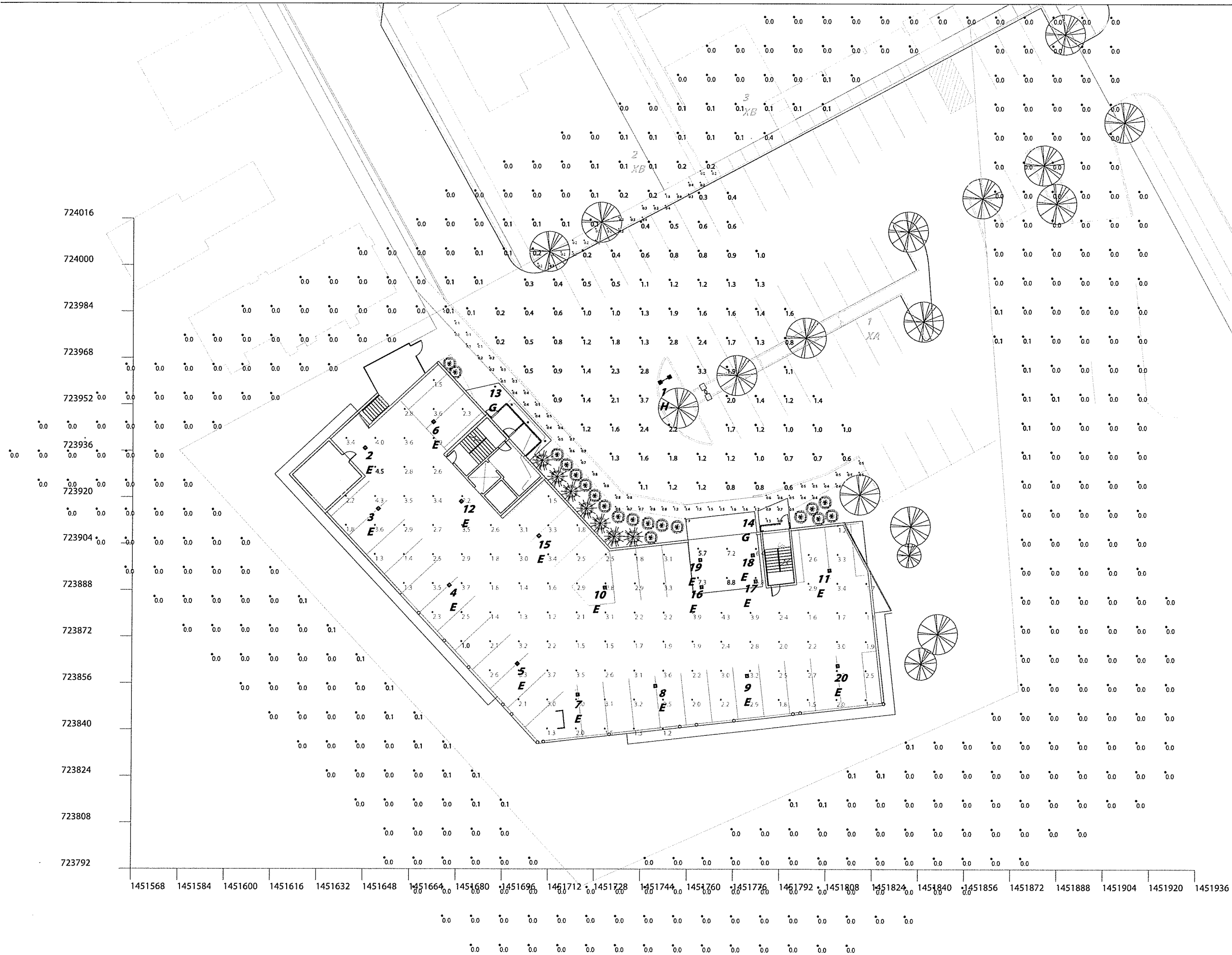


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LANDSCAPE PLAN

As indicated



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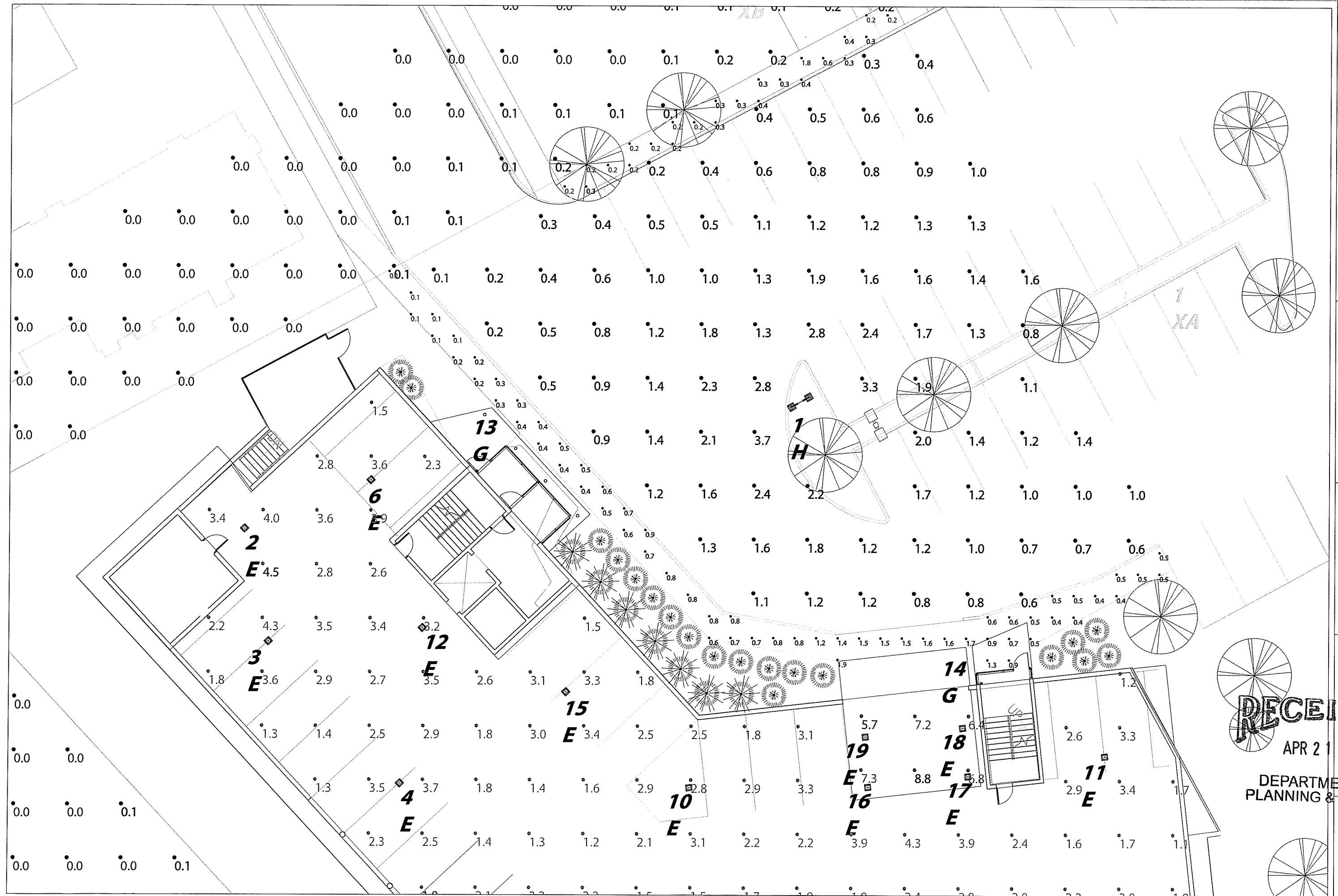
The Lighting Analysis and Visual Simulation (LAVS) provided by RAB Lighting Inc. (RAB) represents an anticipated prediction of lighting system performance based upon design parameters and information supplied by others. These design parameters and information have not been field verified by RAB and therefore actual measured results may vary from the actual field conditions. RAB does not warrant, represent or guarantee the accuracy or completeness of the information provided.

Scale: as noted
Date: 3/24/2017
CASE # 00082280

Job Name:
North Ave Project across from COTS
Burlington, VT

Prepared by:
Holbrook Associates
35 Reservoir Park Drive
Rockland, MA 02370

RAB



The Lighting Analysis, Layout, Energy Analysis and/or Visual Simulation ("Lighting Design") provided by RAB Lighting Inc. ("RAB") represents an anticipated prediction of lighting system performance based upon design parameters and information supplied by others. These design parameters and information have been reviewed by RAB and, to the best of RAB's knowledge, they appear to be accurate and complete. RAB does not warrant, represent or guarantee the accuracy or completeness of the information supplied by others, and RAB accepts no liability for any errors or omissions in the Lighting Design or for any consequences arising therefrom.

Scale: as noted
Date: 3/24/2017
CASE # 00082280

Job Name:
North Ave Project across from COTS
Burlington, VT

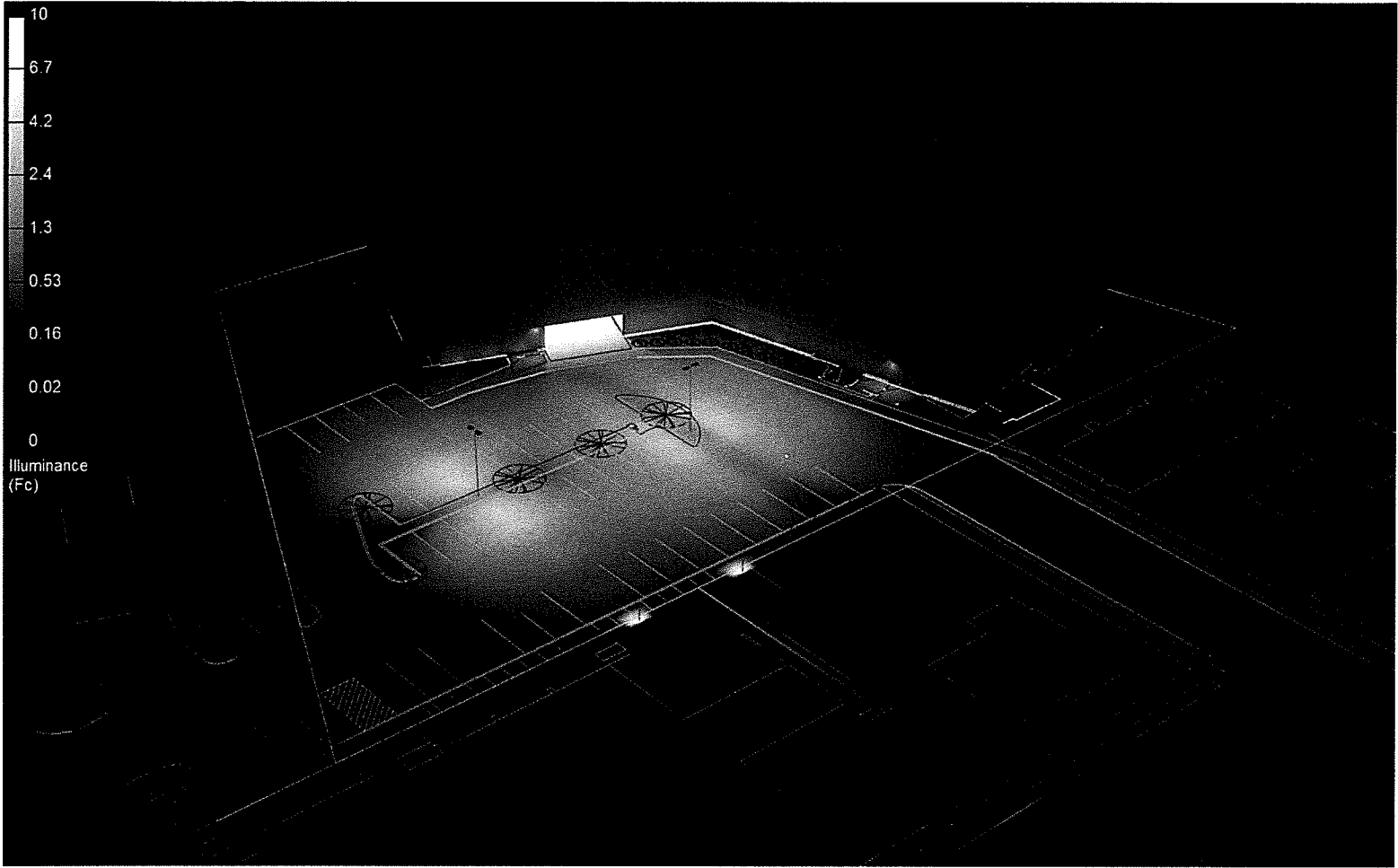
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Prepared For: State of Vermont
Highway 100
35 Reservoir Rd
Burlington, VT 05403

RAB



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The Lighting Analysis, Layout, Energy Analysis and/or Visual Simulation ("Lighting Design") provided by BAB is based on the information supplied by the client. BAB does not warrant the accuracy of the design parameters and information supplied by others. These design parameters and information have not been field verified by BAB and therefore actual measured results may vary from the actual field conditions. BAB recommends that design parameters and other information be field verified to reduce variance.

Scale: as noted
Date: 3/24/2017
Case # 00082280

Job Name:
North Ave Project across from COTS
Burlington, VT

Prepared For:
Holbrook Associated
35 Reservoir Park Drive
Rockland, MA 01370

BAB



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Scale: as noted
Date: 3/24/2017
CASE # 00082280

Job Name:
North Ave Project across from COTS
Burlington, VT

Prepared For:
Holbrook Associated
35 Reservoir Park Drive
Rockland, MA 02370

RAB

Calculation Summary											
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	Description	PtSpcLr	PtSpcTb	Meter Type
CalcPts_1	Illuminance	Fc	1.18	3.7	0.1	11.80	37.00	Readings taken @ 0'-0" AFG	10	10	Horizontal
CalcPts_2 Walkway	Illuminance	Fc	0.34	1.8	0.2	1.70	9.00	Readings taken @ 0'-0" AFG	4	4	Horizontal
CalcPts_Garage Entrance	Illuminance	Fc	7.03	8.8	5.7	1.23	1.54	Readings taken @ 0'-0" AFG	10	10	Horizontal
CalcPts_Offsite	Illuminance	Fc	0.01	0.4	0.0	N.A.	N.A.	Readings taken @ 0'-0" AFG	10	10	Horizontal
CalcPts_Parking Garage	Illuminance	Fc	2.53	4.5	1.0	2.53	4.50	Readings taken @ 0'-0" AFG	10	10	Horizontal
CalcPts_Walkway2	Illuminance	Fc	0.66	1.9	0.1	6.60	19.00	Readings taken @ 0'-0" AFG	4	4	Horizontal

Luminaire Schedule														
Project: Project_1														
Symbol	Qty	Tag	Label	Arrangement	Lum. Lumens	Arr. Lum. Lumens	LLF	Description	Lum. Watts	Arr. Watts	Total Watts	Filename	BUG Rating	
	17	E	PRT30Y	SINGLE	3136	3136	1.000	PRT30Y	29.3	29.3	498.1	PRT30Y - Warm - RAB00786.IES	B2-U4-G2	
	2	G	WPLED5Y	SINGLE	128	128	1.000	WPLED5Y	5.3	5.3	10.6	WPLED5Y-Warm - LSI27623.IES	B0-U1-G0	
	1	H	ALED3T78Y x 2 @ 180°	BACK-BACK	5607	11214	1.000	ALED3T78Y (TYPE III)	78.7	157.4	157.4	ALED3T78Y - Warm - ITL79603.IES	B1-U0-G2	

Expanded Luminaire Location Summary						
Project: Project_1						
LumNo	Tag	X	Y	MTG HT	Orient	Tilt
1	H	1451750.002	723959.709	20	210.03	0
1	H	1451753.24	723961.581	20	30.03	0
2	E	1451648.253	723936.956	7.5	312.936	0
3	E	1451652.811	723916.031	7.5	312.936	0
4	E	1451677.333	723889.675	7.5	312.936	0
5	E	1451701.092	723862.674	7.5	312.936	0
6	E	1451671.663	723945.988	7.5	312.936	0
7	E	1451722.117	723852.044	7.5	6.436	0
8	E	1451748.947	723855.071	7.5	6.436	0
9	E	1451780.625	723858.581	7.5	6.436	0
10	E	1451731.312	723888.92	7.5	6.436	0
11	E	1451808.834	723894.868	7.5	6.436	0
12	E	1451681.37	723918.562	7.5	312.936	0
13	G	1451691.486	723947.724	8	42.936	0
14	G	1451785.772	723908.604	8	95.772	0
15	E	1451708.307	723906.702	7.5	312.936	0
16	E	1451764.707	723889.111	7.5	6.436	0
17	E	1451783.382	723891.133	7.5	6.436	0
18	E	1451782.339	723900.118	7.5	6.436	0
19	E	1451764.179	723898.448	7.5	6.436	0
20	E	1451811.893	723862.027	7.5	6.436	0
Total Quantity: 21						



PRT30Y



WPLED5Y



ALED3T78Y x 2 @ 180°



PS4-11-20D2

NOTES:

* The light loss factor (LLF) is a product of many variables, only lamp lumen depreciation (LLD) has been applied to the calculated results unless otherwise noted. The LLD is the result (quotient) of mean lumens / initial lumens per lamp manufacturers' specifications.

* Illumination values shown (in footcandles) are the predicted results for planes of calculation either horizontal, vertical or inclined as designated in the calculation summary. Meter orientation is normal to the plane of calculation.

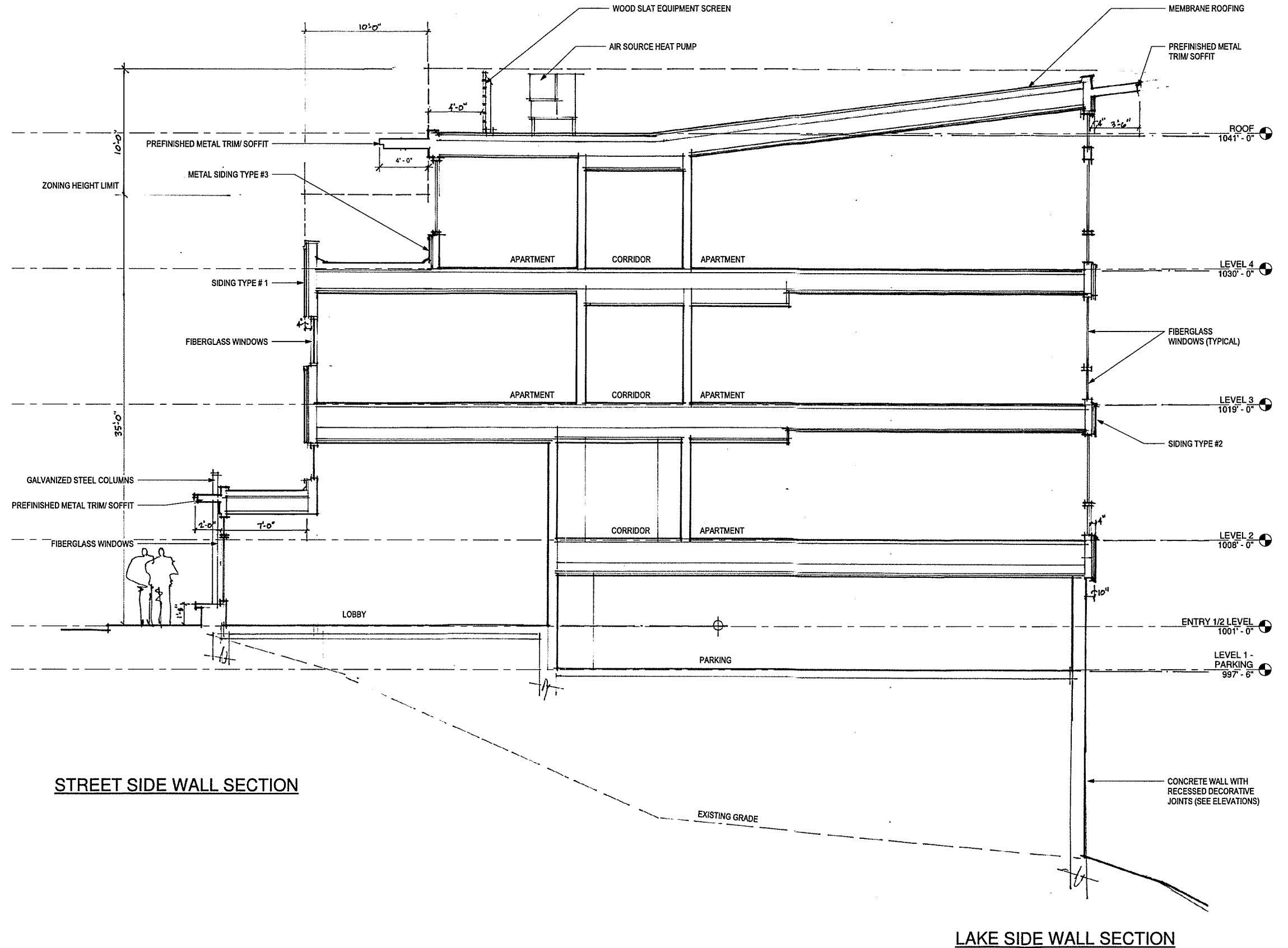
* The calculated results of this lighting simulation represent an anticipated prediction of system performance. Actual measured results may vary from the anticipated performance and are subject to means and methods which are beyond the control of RAB Lighting Inc.

* Mounting height determination is job site specific, our lighting simulations assume a mounting height (insertion point of the luminaire symbol) to be taken at the top of the symbol for ceiling mounted luminaires and at the bottom of the symbol for all other luminaire mounting configurations.

* It is the Owner's responsibility to confirm the suitability of the existing or proposed poles and bases to support the proposed fixtures, based on the weight and EPA of the proposed fixtures and the owner's site soil conditions and wind zone. It is recommended that a professional engineer licensed to practice in the state the site is located be engaged to assist in this determination.

* RAB Lighting Inc. luminaire and product designs are protected under U.S. and International intellectual property laws. Patents issued and pending.

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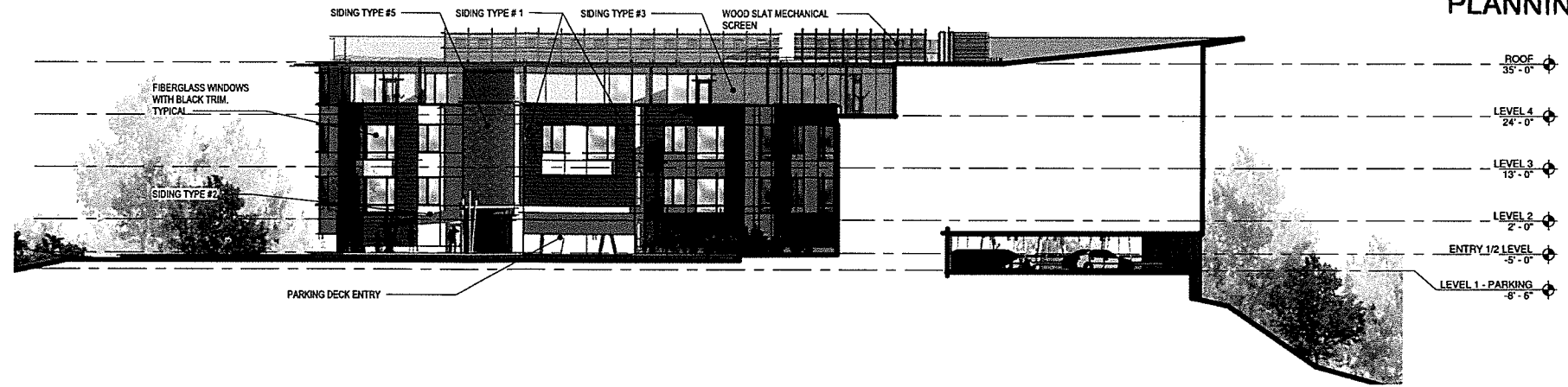


1 BUILDING SECTION
SCALE: 1/4" = 1'-0"

Redstone - 85 North Avenue

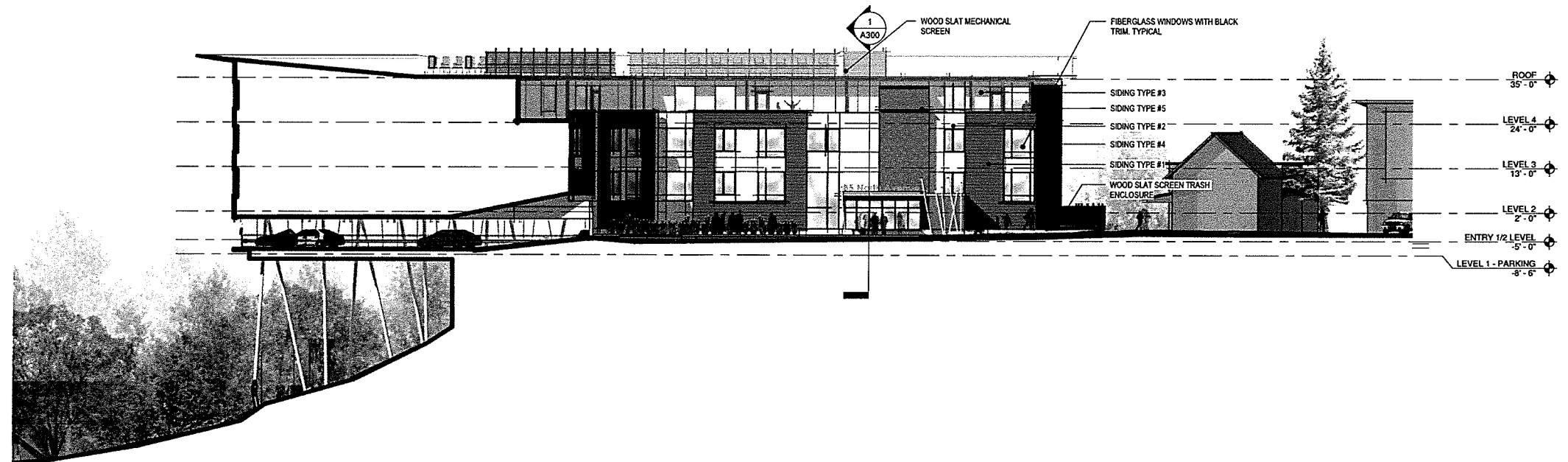
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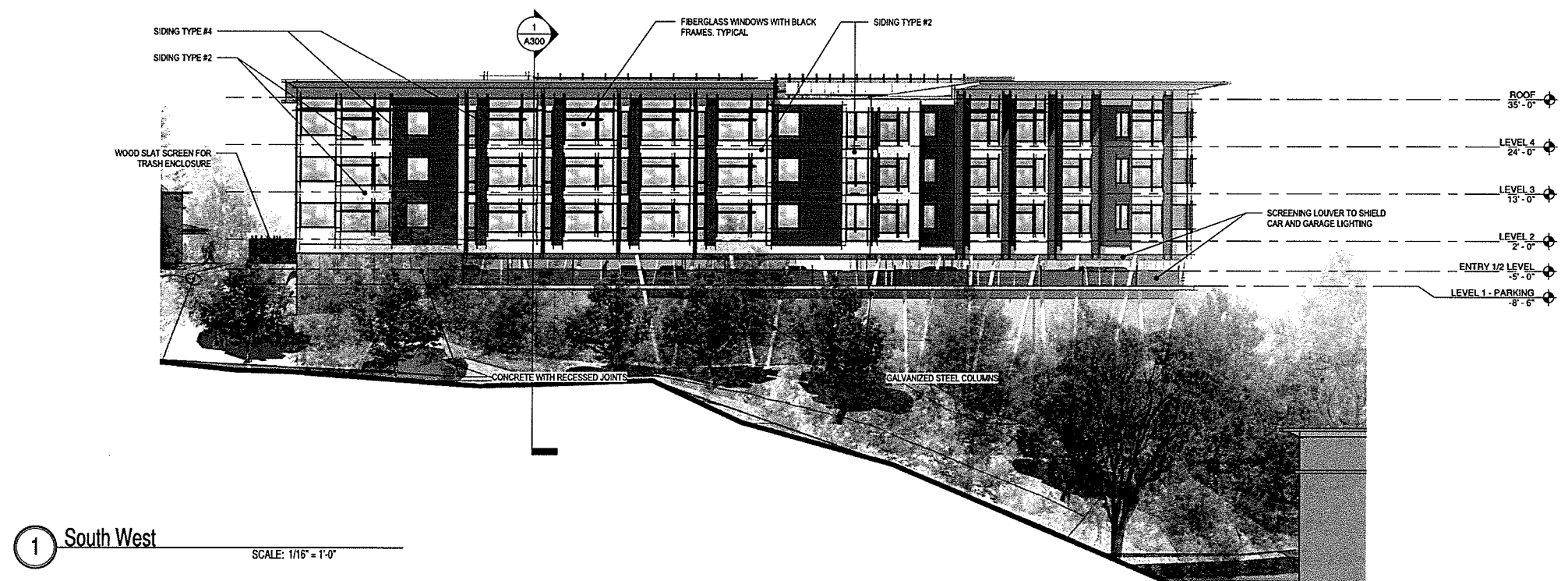
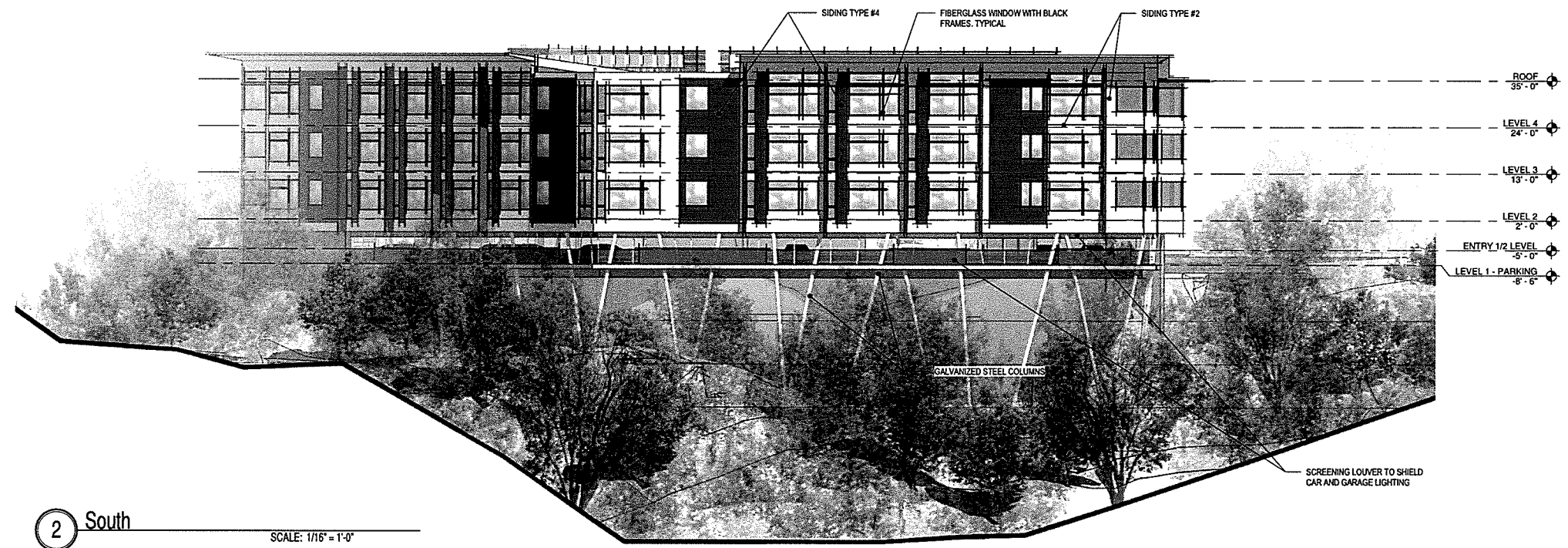
3 North

SCALE: 1/16" = 1'-0"



1 North East

SCALE: 1/16" = 1'-0"



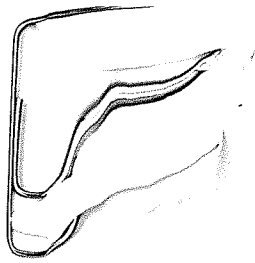
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Redstone - 85 North Avenue

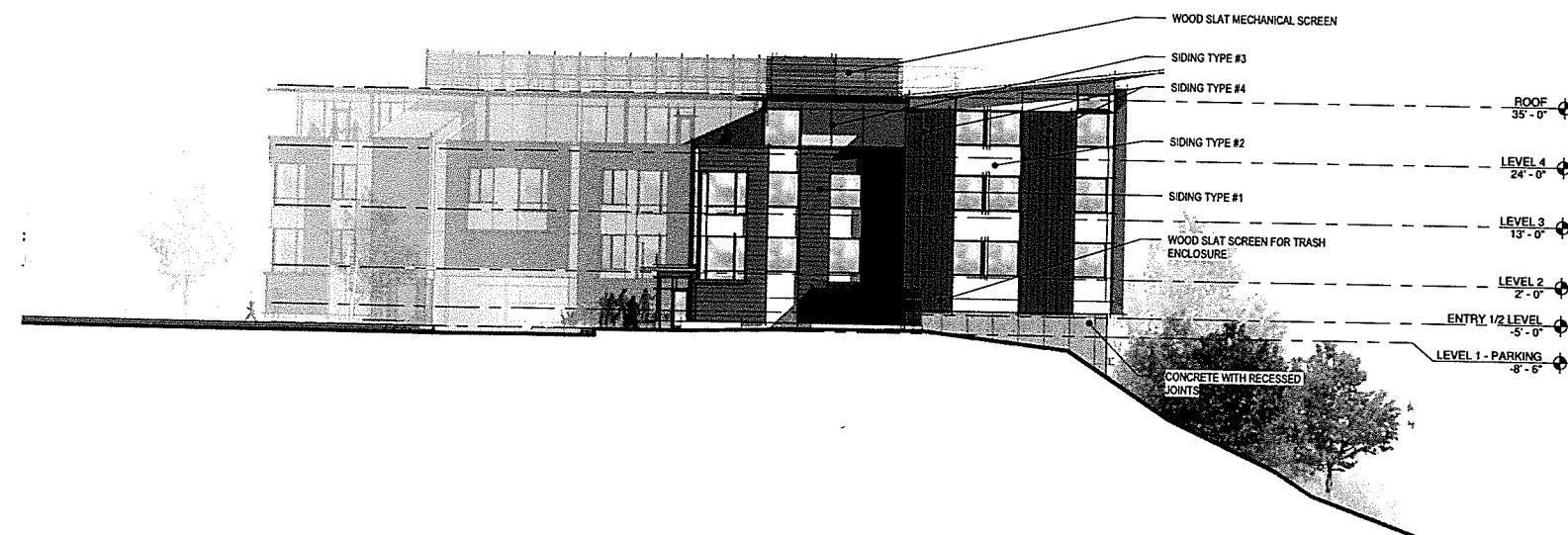
ELEVATIONS



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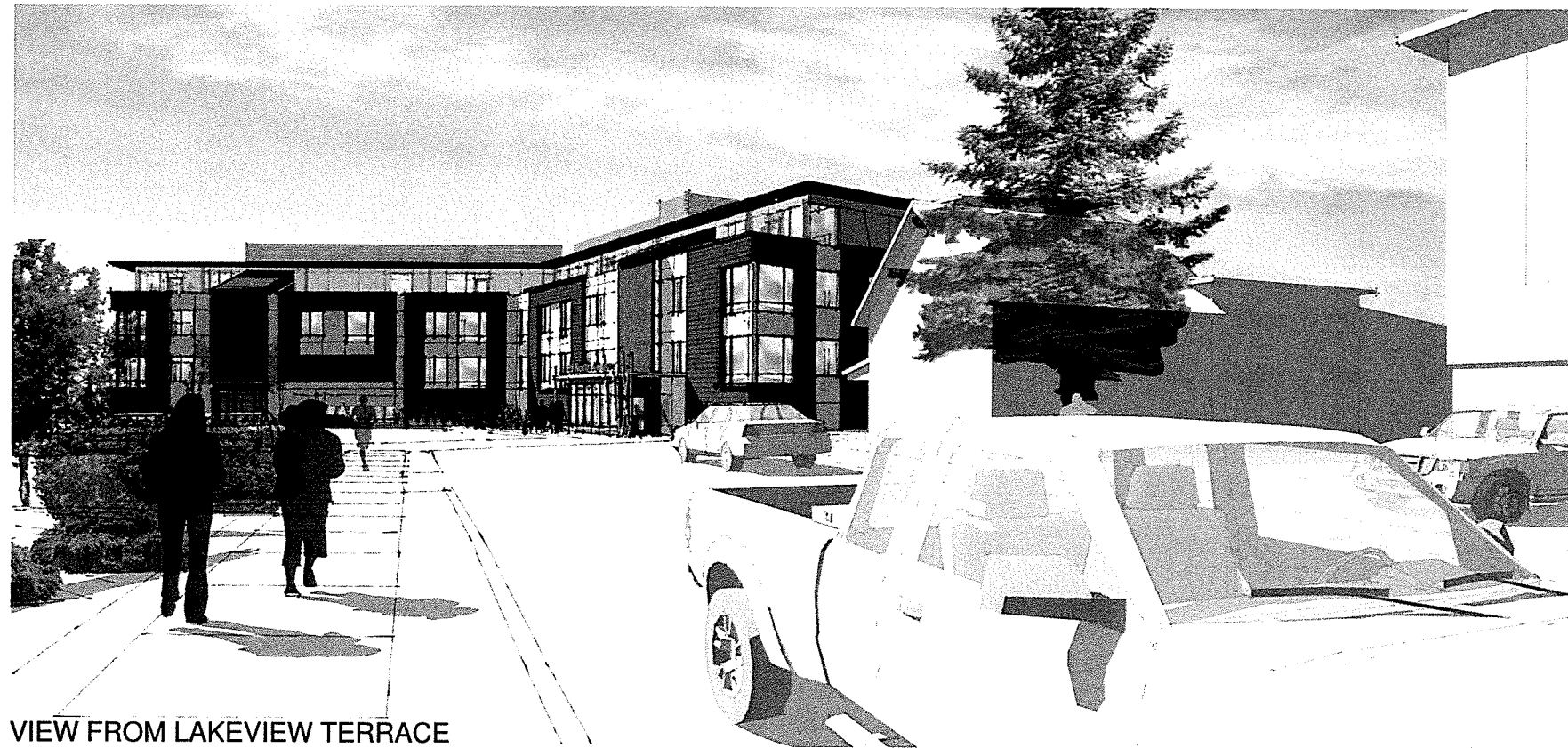
1 North West

SCALE: 1/16" = 1'-0"



2 East

SCALE: 1/16" = 1'-0"



VIEW FROM LAKEVIEW TERRACE



VIEW FROM NORTH AVE

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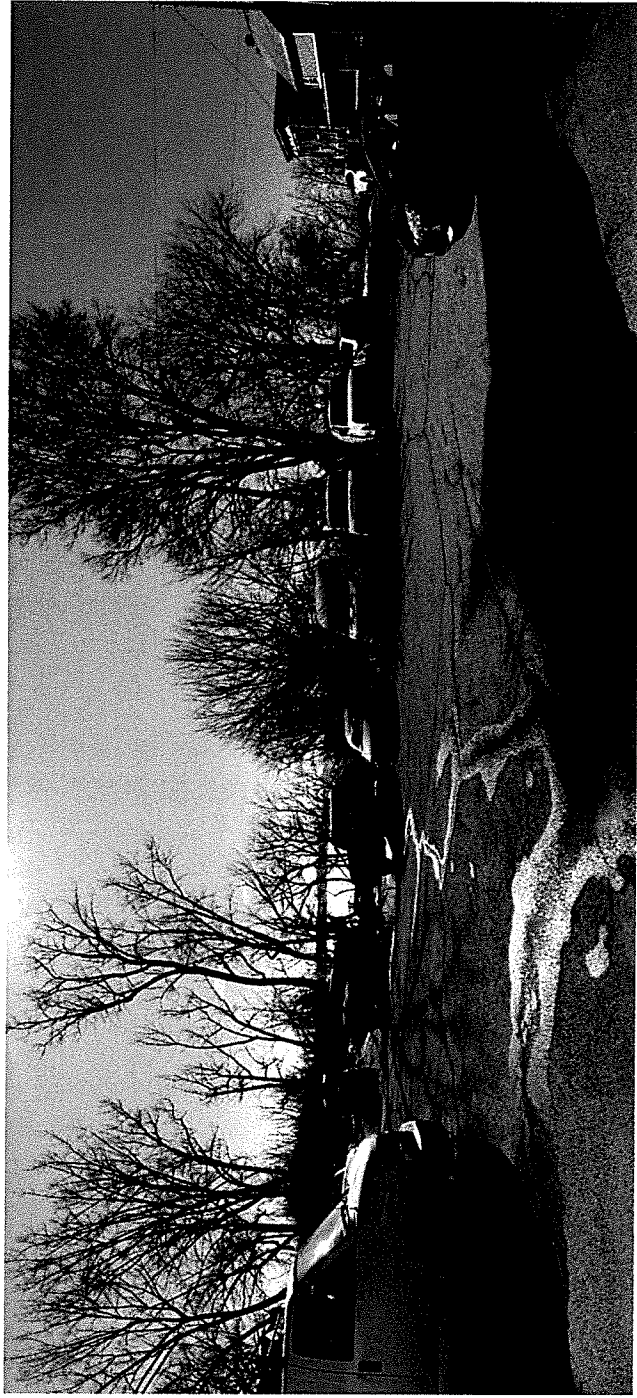
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PERSPECTIVES

85 NORTH AVENUE - EXISTING CONDITIONS PHOTOS



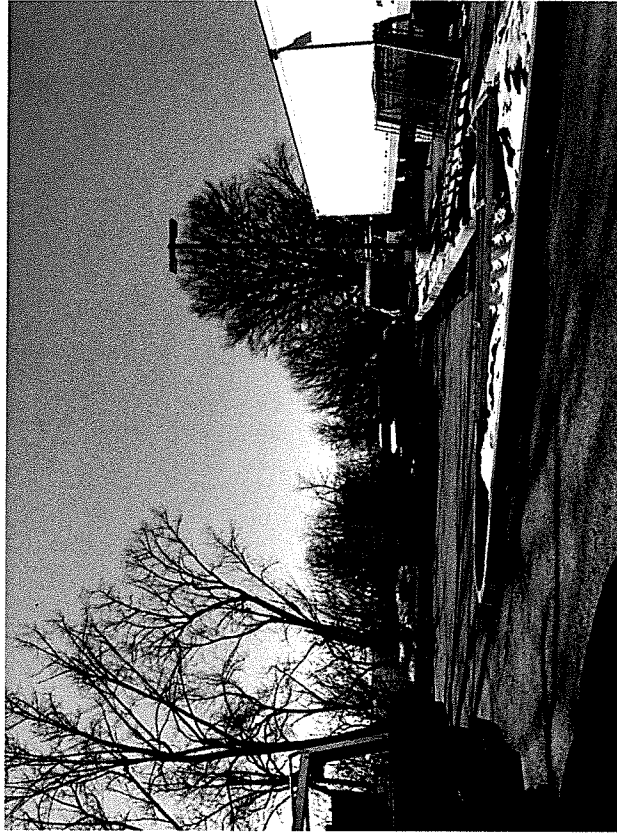
VIEW TO SOUTH FROM LAKEVIEW TERRACE

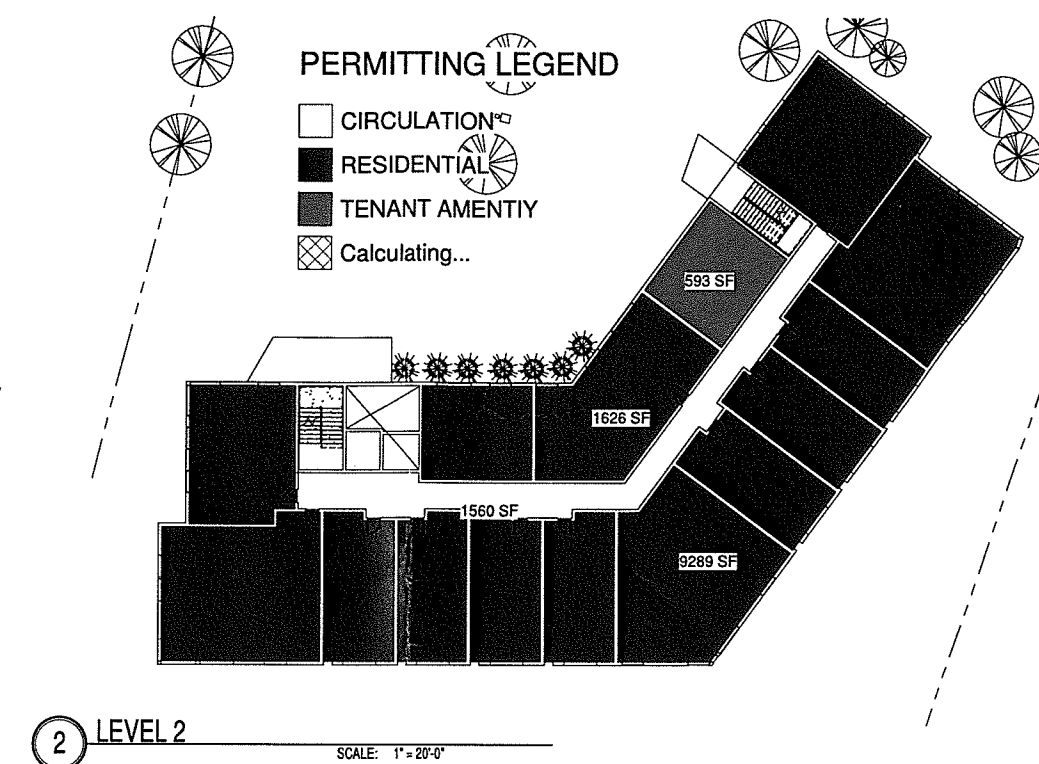
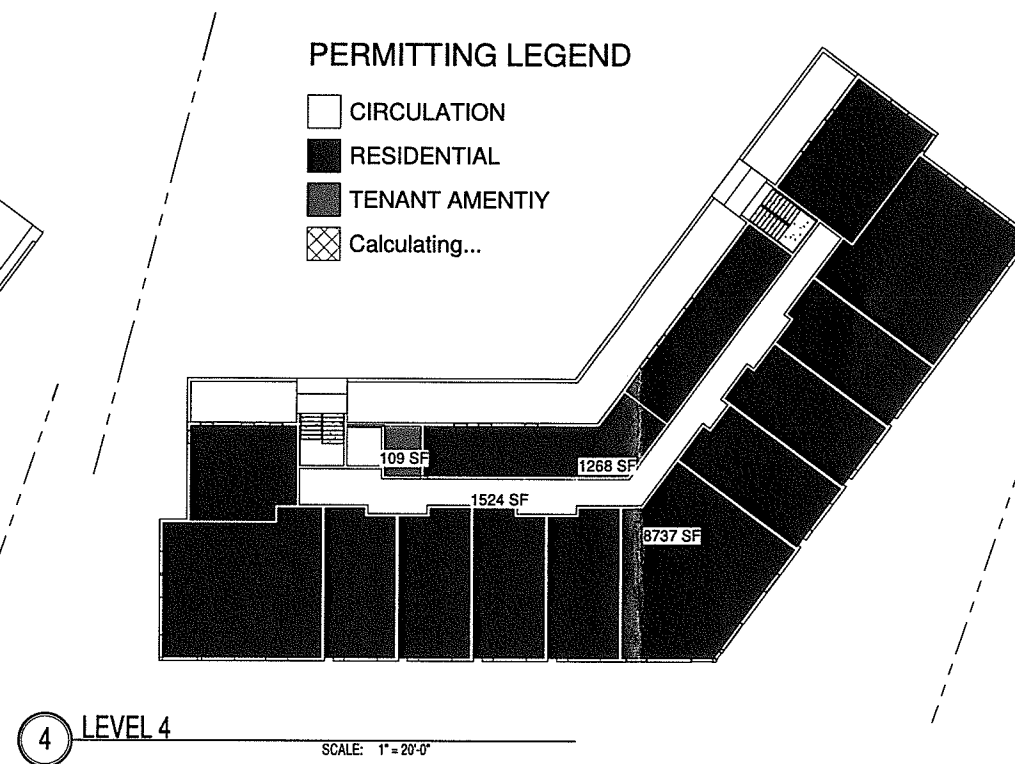
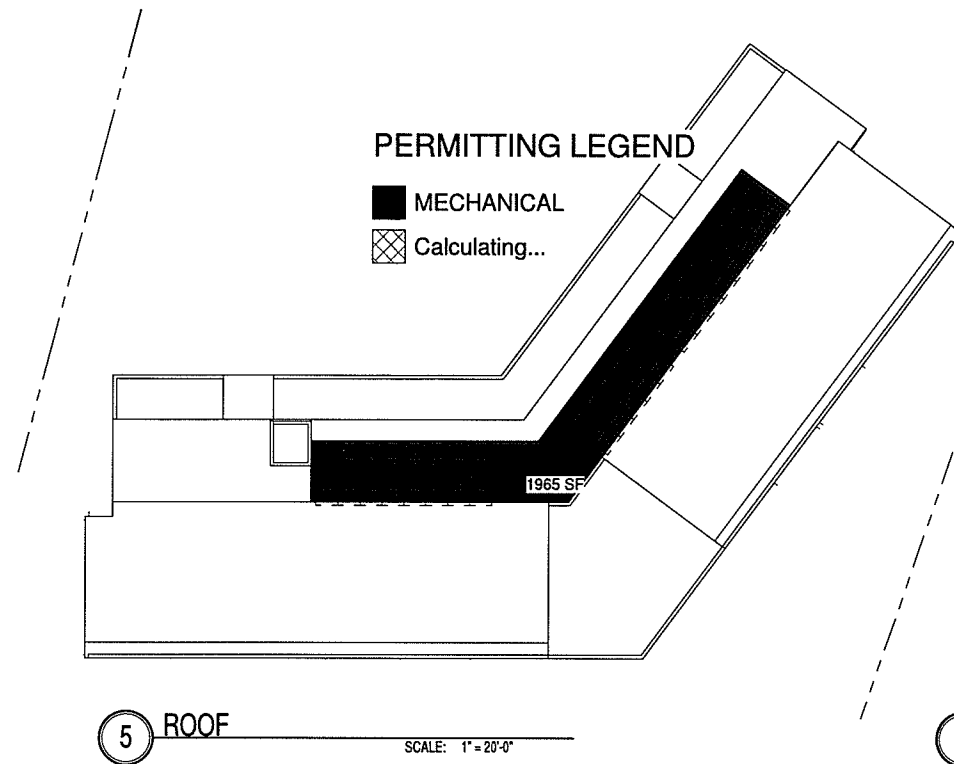


VIEW TO WEST FROM PARKING LOT

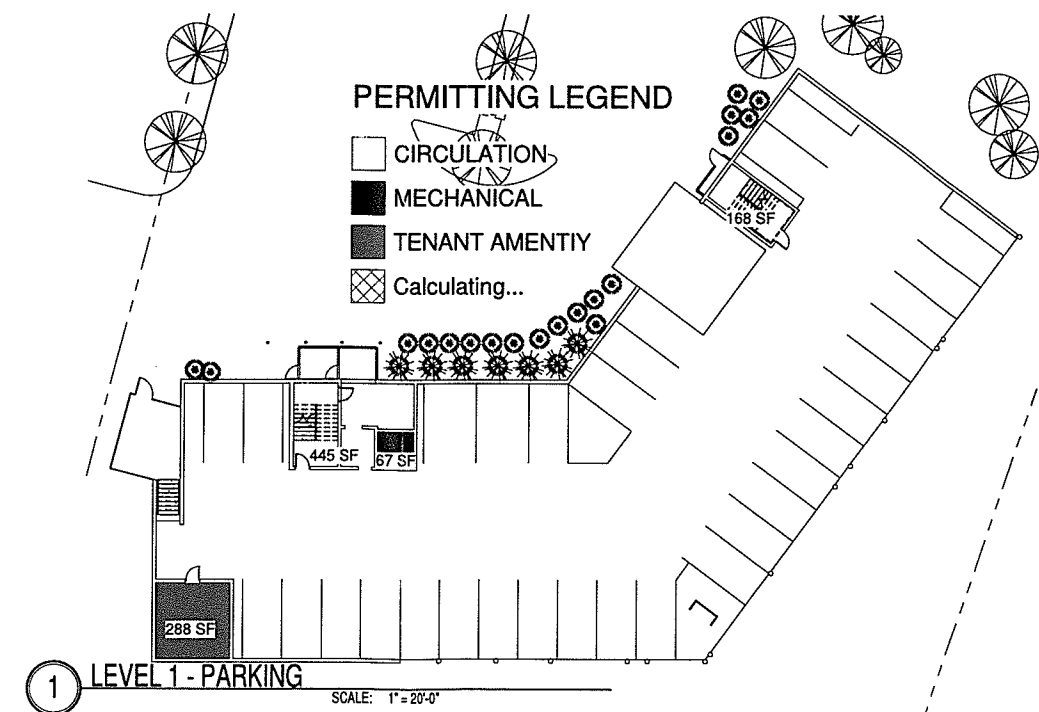
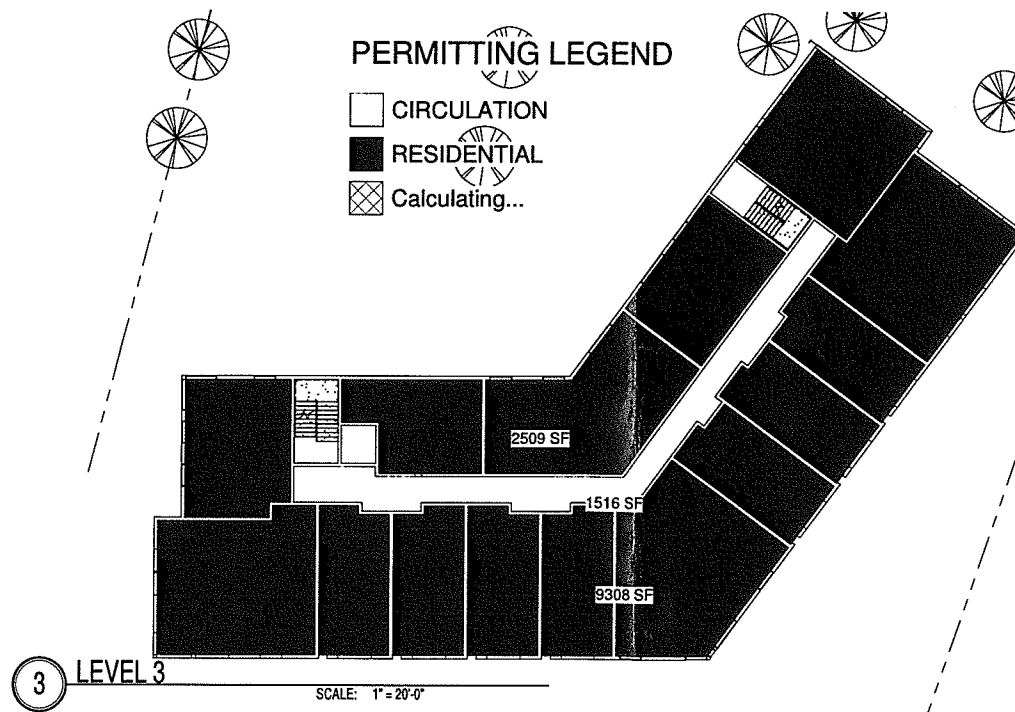


VIEW TO SOUTH OF SLOPE





AREAS	
LEVEL 1 - PARKING	
613 SF	CIRCULATION
67 SF	MECHANICAL
288 SF	TENANT AMENITY
LEVEL 2	
1560 SF	CIRCULATION
10915 SF	RESIDENTIAL
593 SF	TENANT AMENITY
LEVEL 3	
1516 SF	CIRCULATION
11817 SF	RESIDENTIAL
LEVEL 4	
1524 SF	CIRCULATION
10005 SF	RESIDENTIAL
109 SF	TENANT AMENITY
ROOF	
1965 SF	MECHANICAL



Redstone - 85 North Avenue

Scott Gustin

From: Norm Baldwin
Sent: Monday, April 17, 2017 5:27 PM
To: Bryant, Richard (Richard.Bryant@stantec.com)
Cc: Dan Goltzman (dGoltzman@redstonevt.com); Laura Wheelock; Scott Gustin; Chapin Spencer; Nicole Losch
Subject: 85 North Avenue-Development Review
Importance: High

Rick,

I am covering development review while Laura Wheelock is out of the office on maternity leave. Laura will be returning on May 1, 2017.

I had the opportunity to review your Traffic Impact Analysis dated February 24, 2017. On page 4, last paragraph you assert that there should be a downward adjustment of 40% of vehicle trips to account for trips assigned to non-vehicle modes, (60% assigned to vehicles and 40% assigned to non-vehicle trips).

I believe that approximately 15% of the trips could reasonably assigned to non-vehicle modes, while 85% of the trips would be assigned to vehicle trips. This belief comes from reviewing CCRPC modes splits posted on their website and check in with staff monitoring those mode splits on a routine basis. Perhaps you could give me a call to discuss further. You are welcome to call me on my cell phone at 316.6254.

In addition I will be reviewing the site plan with staff here for comments and will be forwarding that information as soon as possible. It is my understanding this project is planned to be on the DRB schedule for May 2, 2017 and I am planning to be out of the office at the close of this week so it is important we have a chance to talk.

Thank you.

Norman J. Baldwin, P.E.
City Engineer/Ass't Director
Burlington Public Works Department
645 Pine Street
Burlington, Vermont 05401

V: 802.865.5826
F: 802.863.0466
EMAIL: nbaldwin@burlingtonvt.gov

Please note that this communication and any response to it will be maintained as a public record and may be subject to disclosure under the Vermont Public Records Act.

April 11, 2017

To Whom it may concern:

I worked at Burlington College for nineteen years. We hired Engineers to test the soil at 85 North Ave to build our new school in 2000. We were told the soil was made up of shale. We were denied a permit to build at this sight. How ~~and~~ can Redstone build on this sight if Burlington College was not allowed to build there. Parking lot was sunken in after Engineers drill 6 holes 30 feet deep. Parking lot caved in.

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PLANNING & ZONING

Brenda Fitzgerald
83 NO. AVE. #6
Burl. VT 05401
802-658-5862

Department of Planning and Zoning

149 Church Street
Burlington, VT 05401
Telephone: (802) 865-7188
(802) 865-7195 (FAX)
(802) 865-7142 (TTY)

David White, AICP, Director
Meagan Tuttle, AICP, Comprehensive Planner
Jay Appleton, GIS Manager
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Ryan Morrison, CFM, Associate Planner
Anita Wade, Zoning Clerk
vacant, Department Secretary



TO: Development Review Board
FROM: Scott Gustin
DATE: May 2, 2017
RE: 17-0755CA/CU; 235 Penny Lane
17-0756CA
17-0757CA

=====

Note: These are staff comments only; decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

Zone: DW-PT Ward: 3C

Owner/Applicant: City of Burlington / Burlington Harbor Marina, LLC

Request: Construct marina, parking lot, and related site improvements.

Applicable Regulations:

Article 3 (Applications, Permits, & Project Reviews), Article 4 (Maps & Districts), Article 5 (Citywide General Regulations), Article 6 (Development Criteria & Guidelines), Article 8 (Parking), Article 10 (Subdivision)

Background Information:

The applicant is seeking approval to establish a marina adjacent to the city's fishing pier at the end of Penny Lane. Most of the facility will actually be floating on the lake and is not included in this zoning permit. The zoning permit sought is for onshore improvements only and, of course, the proposed use. VT ANR and the US Army Corps of Engineers have permitting jurisdiction over the lake encroachment. Onshore construction includes a new marina yard and drop-off plaza, conversion of the present lakeside parking lot into park space, and construction of a new parking area east of the Burlington Electric Dept. building (where the approved but not constructed Moran parking lot was to be located). The existing pavilion next to the Water Department building will be demolished. The project spans three parcels and, therefore, includes three zoning permit applications – all reviewed concurrently. Lot line adjustments affect two of the parcels.

The Conservation Board reviewed this project February 6, 2017 and unanimously recommended approval of the project as presented.

The marina is a permitted use in the Downtown Waterfront – Public Trust (DW-PT) zone. Following comment from the state floodplain coordinator, the original plans have been revised to move all onshore construction above the 102' elevation (limit of the base flood); however, the proposed gangway necessarily crosses a small sliver of land between the upland and floating marina facilities that lies within the Special Flood Hazard Area (SFHA) – between 95.5' and 102' elevation. This encroachment into the SFHA triggers conditional use review in addition to the

SFHA review criteria under Sec. 4.5.4. The conditional use criteria have nothing to do with the SFHA criteria; however, this conditional use trigger was missed as part of zoning amendment ZA-15-02 that limited conditional use review to only those uses noted as conditional use in *Appendix A – Use Table – All Zoning Districts*. As noted above, the state floodplain coordinator has reviewed and commented on the proposal.

There is no previous zoning activity for this particular address. The public fishing pier (under 0 Lake St) was approved 8/26/99.

The Development Review Board initially reviewed this proposal on March 21, 2017. The Board continued the public hearing to allow the applicant time to address outstanding items related to parking, traffic, infrastructure, and comments of the state's Floodplain Coordinator. Additional information has been provided to address those items, and city staff and the applicants will be present at the May 2, 2017 public hearing. Changes to these findings are underlined in red.

Recommendation: Certificate of Appropriateness and Conditional Use approval as per, and subject to, the following findings and conditions.

I. Findings

Article 1: General Provisions

Part 1: General Provisions

Sec. 1.1.4 Jurisdiction

Question was raised as to why review of this zoning permit application does not include the floating components of the proposed marina. The Comprehensive Development Ordinance expressly applies to all land within the City of Burlington. Its jurisdiction does not extend to the waters of Lake Champlain. As noted above, state and federal jurisdictions apply within the waters of the lake. A nearby example of this arrangement is the Burlington Boat House. It floats on the lake and did not receive a zoning permit. A requested opinion from the City Attorney's Office remains pending. (Affirmative finding)

Article 3: Applications and Reviews

Part 5, Conditional Use & Major Impact Review:

Section 3.5.6 (a) Conditional Use Review Standards

Approval shall be granted only if the DRB, after public notice and public hearing, determines that the proposed conditional use and associated development shall not result in an undue adverse effect on each of the following general standards:

- 1. Existing or planned public utilities, facilities or services are capable of supporting the proposed use in addition to the existing uses in the area;*

The proposed development will be served by municipal utilities. Sufficient water and sewer service are available. A State of Vermont wastewater permit will be required. A capacity letter issued by the Dept. of Public Works has been obtained. Impact fees will be paid to help offset impacts on municipal utilities and facilities. **(Affirmative finding as conditioned)**

- 2. The character of the area affected as defined by the purpose or purposes of the zoning district(s) within which the project is located, and specifically stated policies and standards of the municipal development plan;*

The subject property is located in the Downtown Waterfront – Public Trust (DW-PT) District. This district is intended to enhance and diversify commercial and residential development in the downtown waterfront area, and to increase access, utilization, and enjoyment of the lakeshore by the community. Strong emphasis is placed on enhancing public access to the lakeshore. The proposed marina is consistent with this intent. **(Affirmative finding)**

3. *The proposed use will not have nuisance impacts from noise, odor, dust, heat, and vibrations greater than typically generated by other permitted uses in the same zoning district;*

The proposed marina is not expected to generate nuisance impacts from noise, odor, dust, and the like that may be more typically associated with industrial uses. The proposed construction is set far from homes further south along Lake Street. **(Affirmative finding)**

4. *The transportation system is capable of supporting the proposed use in addition to the existing uses in the area. Evaluation factors include street designations and capacity; level of service and other performance measures; access to arterial roadways; connectivity; transit availability; parking and access; impacts on pedestrian, bicycle and transit circulation; safety for all modes; and adequate transportation demand management strategies;*

See Sec. 6.2.2 (i) for traffic analysis.

and,

5. *The utilization of renewable energy resources;*

No renewable energy utilization is included in this proposal. Future incorporation is not precluded by the project design. **(Affirmative finding)**

and,

6. *Any standards or factors set forth in existing City bylaws and city and state ordinances;*

As noted previously, the project is subject to VT ANR and the US Army Corps of Engineers jurisdiction. City building and energy efficiency codes will also apply.

(b) Major Impact Review Standards

Not applicable.

(c) Conditions of Approval:

In addition to imposing conditions of approval necessary to satisfy the General Standards specified in (a) or (b) above, the DRB may also impose additional conditions of approval relative to any of the following:

1. *Mitigation measures, including but not limited to screening, landscaping, where necessary to reduce noise and glare and to maintain the property in a character in keeping with the surrounding area.*

The proposed development is not expected to produce offsite noise or glare substantial enough to require mitigation. **(Affirmative finding)**

2. *Time limits for construction.*

No construction timeline or phasing are included in the project plans. The standard 2-year timeframe for zoning permits will apply. **(Affirmative finding)**

3. Hours of operation and/or construction to reduce the impacts on surrounding properties.

The marina will function seasonally between May 15 and October 15. The marina and fuel dock will be open for business from 7am-6pm Sun-Thurs and 7am-8pm Friday, Saturday, Holidays and the day preceding a holiday. The public restrooms will be open and available to the public from 8am-5pm Sun-Thurs and 8am-7pm Friday and Saturday. The outer perimeter wave attenuating dock will be open to the public from 7am to 10pm.

Construction hours are not noted in the application. Typical construction hours are Monday – Friday from 7:00 AM – 5:00 PM. Saturday construction may be allowed upon request. No work on Sunday. **(Affirmative finding as conditioned)**

4. That any future enlargement or alteration of the use return for review to the DRB to permit the specifying of new conditions; and,

Any future enlargement or alteration will be reviewed under the zoning regulations in effect at that time.

5. Such additional reasonable performance standards, conditions and safeguards, as it may deem necessary to implement the purposes of this chapter and the zoning regulations.

See the recommended conditions.

Section 3.2.10 Performance Bond or Financial Surety (previously under Sec. 10.1.10)

As new public improvements are included in this proposal – new public park space – this criterion applies. The DRB may require from the property owner, for the benefit of the city, a performance bond or other financial surety to assure completion of the proposed public improvements.

(Affirmative finding as conditioned)

Article 4: Maps & Districts

Sec. 4.4.1, Downtown Mixed Use Districts:

(a) Purpose

(4) Downtown Waterfront – Public Trust District (DW-PT)

The subject property is located in the Downtown Waterfront – Public Trust (DW-PT) District. This district is intended to enhance and diversify commercial and residential development in the downtown waterfront area, and to increase access, utilization, and enjoyment of the lakeshore by the community. Strong emphasis is placed on enhancing public access to the lakeshore.

The proposed marina is consistent with this intent. It will be open to the public, including access onto the floating facilities. It will also add a sizable water-dependent business to Burlington's downtown waterfront. **(Affirmative finding)**

(b) Dimensional Standards & Density

A FAR of 2 is allowed in the DW-PT zone. No new onshore buildings are included in this proposal. Existing FAR will remain unchanged.

There is no lot coverage limit in the DW-PT zone.

No minimum setbacks apply to the project as proposed.

No new onshore buildings are proposed. Existing building height remains unchanged.

(Affirmative finding)

(c) Permitted & Conditional Uses

See (d) 2 below.

(d) District Specific Regulations

1. Use Restrictions

A. Ground Floor Residential Uses Restricted

(Not applicable)

2. Public Trust Restrictions

The subject property is located within that area of the DW-PT north of Main Street. The proposed marina – open to the public on a non-discriminatory basis – is a permitted use. **(Affirmative finding)**

3. Facades and Setbacks on Side and Rear Property Lines

(Not applicable)

4. Building Height Setbacks

A. Principal View Corridors

(Not applicable)

B. Church Street Buildings

(Not applicable)

C. Side Street Building Height

(Not applicable)

5. Lake Champlain Waterfront Setbacks

No new onshore buildings are included in this proposal. Proposed site work continues to allow public access to the lakeshore. **(Affirmative finding)**

6. Residential District Setback

(Not applicable)

7. Development Bonuses/Additional Allowances

None are sought.

Sec. 4.5.4, Natural Resource Protection Overlay District:

Minimal encroachment into the SFHA is proposed. It amounts to the gangway connecting the upland marina facilities with the floating marina facilities.

(a) District Specific Regulations: Special Flood Hazard Area

(7) Special Review Criteria

A. The danger to life and property...

The proposed marina will have no impact on flood heights or velocities. **(Affirmative finding)**

B. The danger that material may be swept onto other lands...

The gangway and related floating marina facilities will be anchored in place. The proposed UST must be strapped down to prevent buoyancy in the event of a flood. Flood velocities are typically not problematic along the lakeshore. Flood waters rise and then fall. Velocity is a danger within the floodway that follows the river corridor. There is little danger that the marina facilities will be swept away. **(Affirmative finding as conditioned)**

C. The proposed water supply and sanitation systems...

Municipal water and sewer will serve the marina. Utility plans and specifications sheets depict the details. They have been reviewed by the Department of Public Works. Comments from DPW recommend that a waterproof cover be provided for the pump station to prevent floodwater infiltration. There is no onsite septic system. **(Affirmative finding as conditioned)**

D. The susceptibility of the proposed facility and its contents to flood damage...

The gangway and related floating facilities will rise and fall with lake levels. They are very unlikely to ever be inundated. **(Affirmative finding)**

E. The importance of the services provided...

The proposed marina will serve as a significant public amenity affording improved access to the lakeshore. An existing lakeshore parking lot will be transformed to additional public parkland and marina space. **(Affirmative finding)**

F. The availability of alternative locations...

The gangway connects the upland marina facilities with the related floating facilities. It is a functionally dependent use necessarily located within the SFHA. **(Affirmative finding)**

G. The compatibility of the proposed use with existing development...

As noted elsewhere in these findings, the marina is consistent with the intent of the DW-PT zone. **(Affirmative finding)**

H. The relationship of the proposed use to the Municipal Development Plan...

PlanBTV: Downtown and Waterfront specifically calls for additional marina operations to better serve the intense demand for water uses along Burlington's downtown water front. The plan notes the present conditions as inadequate and cites the exiting 8-year wait list for a boat slip (Water Use Expansion)

The proposed marina is accessible by boat, vehicle, bus, bike, and foot. It is consistent with PlanBTV: Downtown and Waterfront's call for transportation options and connectivity (Yield to Pedestrians, Biking, Bikeways, and Transit).

The pervious pavers to be used in construction of the marina facilities are consistent with the provisions of PlanBTV: Downtown and Waterfront (The Green Machine). **(Affirmative finding)**

I. The safety of access to the property...

Access to the property will be unaffected by the base flood event. All of the onshore marina facilities are located outside of the SFHA. The gangway and related floating facilities will rise and fall with the lake level. **(Affirmative finding)**

J. The expected heights, velocity, duration, rate of rise...

The maximum regulatory flood elevation along the lakeshore is 102' above sea level. The velocity of flood waters along the lakeshore is not problematic. Water is more or less stationary as it rises and falls. The duration of flooding and the rate of its rise depend entirely on spring snowmelt and precipitation events. The lake has risen above 102' just once on record (spring 2011). Sediment transport is insubstantial. Sediment transport is associated with moving waterways such as rivers. The proposed marina will have no impact on flood height, velocity, duration, rate of rise, or sediment transport. **(Affirmative finding)**

K. Conformance with all other applicable requirements...

See Articles 4, 5, and 6 of these findings.

Article 5: Citywide General Regulations

Sec. 5.2.3, Lot Coverage Requirements

See Article 4 above.

Sec. 5.2.4, Buildable Area Calculation

Not applicable in the DW-PT zone.

Sec. 5.2.5, Setbacks

See Article 4 above.

Sec. 5.2.6, Building Height Limits

See Article 4 above.

Sec. 5.2.7, Density and Intensity of Development Calculations

See Article 4 above.

Sec. 5.5.1, Nuisance Regulations

Nothing in the proposal appears to constitute a nuisance under this criterion. **(Affirmative finding)**

Sec. 5.5.2, Outdoor Lighting

A comprehensive outdoor lighting plan has been submitted. Information relative to fixtures, locations, and illumination levels has been provided. There are two distinct lighting environments: 1) the marina site and 2) the parking lot. All of proposed fixtures and related lighting levels are acceptable under the standards of Sec. 5.5.2. The pole lights to be used in the newly converted park area appear to match those at Waterfront Park. The Department of Parks and Recreation has confirmed. The single new flag pole will be illuminated from above. **(Affirmative finding)**

Sec. 5.5.3, Stormwater and Erosion Control

The project will actually result in less impervious surface as compared to existing conditions. An existing asphalt parking lot will be converted to park area with substantial lawn. Pervious pavers will be installed at the new marina yard. Stormwater management relies on infiltration and additional green space prior to discharge offsite. As noted previously, the Conservation Board

reviewed and recommended approval of this project. Final approval of the proposed stormwater management plan and erosion prevention and sediment control plan by the city's stormwater program has been obtained. **(Affirmative finding)**

Article 6: Development Review Standards:

Part 1, Land Division Design Standards

Sec. 6.1.2, Review Standards

No land subdivision is proposed. Two of the three lots, however, will be adjusted in size and configuration.

(a) Protection of important natural features

See Sec. 6.2.2.

(b) Block size and arrangement

Block size and arrangement will remain unchanged. **(Affirmative finding)**

(c) Arrangement of Lots

The proposed lot line adjustment serves to place the bulk of the marina facilities on Parcel C with the existing municipal buildings on Parcel B. The proposed lot arrangement is orderly and follows the existing and proposed conditions on the ground. **(Affirmative finding)**

(d) Connectivity of streets within the city street grid

Not applicable.

(e) Connectivity of sidewalks, trails, and natural systems

Not applicable.

Part 2, Site Plan Design Standards

Sec. 6.2.2, Review Standards

(a) Protection of important natural features

The property does not contain any important natural features as identified in the Open Space Protection Plan or as outlined in Sec. 4.5.4, *Natural Resource Protection Overlay Districts*. The downtown waterfront is specifically excluded from the Riparian & Littoral Conservation zone. **(Affirmative finding)**

(b) Topographical alterations

The existing property is essentially flat and will remain so. Topographic alteration is modest and is largely related to stormwater improvements and construction of the new parking area.

(Affirmative finding)

(c) Protection of important public views

There are significant public views from the subject property, particularly westward across the lake. These views will be preserved. The proposed construction will not adversely impact any identified public view corridor. **(Affirmative finding)**

(d) Protection of important cultural resources

The property is a lakeshore fill site of industrial origin. It has no known archaeological significance. It contains no archaeological site points, nor is it located within an archaeologically sensitive area. **(Affirmative finding)**

(e) Supporting the use of alternative energy

No alternative energies are incorporated into the project design. Construction of the project will have no adverse impact on potential use of alternative energies onsite. **(Affirmative finding)**

(f) Brownfield sites

The subject property is included on the Vermont DEC Hazardous Site List. Phase I and II environmental site assessments have been done, and a corrective action plan is in place. The applicant will continue to work with VT DEC to address onsite contaminants. **(Affirmative finding)**

(g) Provide for nature's events

See Sec. 5.5.3 for stormwater management.

There is sufficient room for snow storage around the new parking lot. Within the marina yard and drop-off plaza, there is no dedicated space for snow storage. Given the seasonal operation of the marina, winter time snow storage within these places may be acceptable. **(Affirmative finding)**

(h) Building location and orientation

No new onshore buildings are included in this proposal. **(Not applicable)**

(i) Vehicular access

Two access points will serve the marina. Both exist presently but will be modified as part of this project. Most boats will arrive at the marina by way of the lake. No new ramp or crane are included in this proposal.

A comprehensive traffic analysis has been done as part of this application; however, anticipated traffic generation (up to 20 weekday PM peak hour trips) is well short of the typical 75-trip threshold for a traffic study. Anticipated traffic is also significantly less than that associated with the unbuilt Moran redevelopment (77 PM peak hour trip ends). Traffic associated with the marina will parallel the seasonal use of the marina – most active during the warmer months with very little activity during the off-season colder months. As to be expected, Saturdays are anticipated to generate the most traffic with 309 total trip ends and 26 PM peak hour trip ends. Daily weekday trip ends are expected to total 284 with 20 PM peak hour trip ends. Level of service (LOS) and queue lengths were analyzed at three intersections (Battery & College Streets, College & Main Streets, and Lake Street & Penny Lane) with projections for 2018 and 2023 with build and no-build scenarios. In all scenarios, the anticipated traffic is expected to have little effect on intersection LOS during the PM peak hour (1 second or less increase in delay) and negligible effect on intersection queue lengths. All intersections are expected to continue at acceptable levels of service. No roadway network alterations are proposed. The Department of Public Works has reviewed the traffic study and concurs with its findings. **(Affirmative finding)**

(j) Pedestrian access

A new sidewalk/walkway will provide a pedestrian connection between the newly reconstructed bike path and the marina. It will also afford a connection to the marina for people parking in the

new surface parking lot behind the Electric Dept. building. Given the significance of public accessibility to the marina, this pedestrian connection is particularly important. Where the sidewalk crosses the two entries to the new parking area, it is delineated with striping. It should be continuous concrete. West of the new parking area, the sidewalk becomes a striped walkway across the asphalt, sharing space with vehicles. Continuation of concrete had previously been recommended; however, the Department of Public Works recommends the striped asphalt instead. Doing so avoids disturbance of critical underground piping connecting the two Water Department buildings. **(Affirmative finding)**

(k) Accessibility for the handicapped

Four handicap parking spaces are included in the marina drop-off area that will be available to the public, affording immediate access to the marina and the newly formed park space. Additional handicap spaces are included in the new 68-space parking lot. Insofar as these, or any other handicap accessible features, are required it is the applicant's responsibility to comply. All of the applicable ADA requirements are administered through the city's building code. **(Affirmative finding as conditioned)**

(l) Parking and circulation

Space for new parking is limited. The marina is, of course, set close to the lake and relatively far from the road. As a result, space for parking is available between the existing Water Department and Electric Department buildings and the road. The existing parking area will be removed and replaced with the new, larger parking area. As recommended by this criterion, the parking area is split into two sections rather than a singular mass. The location of the new parking lot is the same as that for the approved, but unbuilt, parking associated with the Moran redevelopment.

Parking spaces and associated site circulation are laid out such that vehicles will not back out onto Penny Lane. The parking area appears to be curbed at one end (east).

A number of new trees will be planted around the parking lot. In total, 18 new trees will border the parking area. This criterion requires 1 shade tree per every 5 parking spaces (at least 14 trees in this case). The proposed species (maple, elm, and honeylocust) are appropriate to serve as shade trees and meet the minimum caliper requirement at planting (3" – 3.5" caliper). A shade analysis was provided at the March 21, 2017 public hearing and depicted adequate shading. **(Affirmative finding)**

(m) Landscaping and fences

A comprehensive landscaping plan has been submitted and encompasses a diversity of plantings. As noted above, new shade trees will be planted around the new parking area. Most of the additional landscaping is concentrated in the new park space adjacent to the Water Department Pump Station. New plantings help to define the space and provide a buffer from the marina drop-off to the south. Some additional plantings will accent said drop-off area. **(Affirmative finding)**

(n) Public plazas and open space

Significant public open space is included in this proposal. The parking lot behind the two existing city buildings will be removed and replaced on one end with new public park space. In addition to new landscaping as noted above, the new park space will include pathways, sitting areas, and access to the lakeshore. Its location will afford ample solar access and unimpeded views across the lake. **(Affirmative finding)**

(o) Outdoor lighting

See Sec. 5.5.2.

(p) Integrate infrastructure into the design

Site infrastructure including an electrical transformer, emergency generator, trash and recycling facilities will be set to the southwest corner of the marina site. The site plans depict screening around these items. Sheet C4.2 provides acceptable screening details. Any new utility lines must be buried. **(Affirmative finding)**

Part 3, Architectural Design Standards

Sec. 6.3.2, Review Standards

No new onshore buildings are included in this proposal. Two containers for workshop space and long term bike parking are proposed. Renderings of these containers were provided at the March 21, 2017 public hearing. **(Affirmative finding)**

Article 8: Parking

Sec. 8.1.8, Minimum Off-Street Parking Requirements

The proposed marina is located in the Downtown Parking District. As a result, the minimum parking requirement is 0.5 parking space per berth. In this case, 160 berths are proposed with a resultant minimum parking requirement of 80 parking spaces. A new 68-space parking lot is proposed. The marina proposes to use 42 of these 68 spaces along with an additional 4 new spaces in the separate lot between the Coast Guard and the Water Department building and 2 new handicap spaces at the marina drop-off (48 spaces total for the marina). The Community Sailing Center had considered using the remaining 26 spaces in the 68-space parking lot; however, they are expected to pull out of this arrangement and seek alternative parking under separate permit. There remain 10 short term spaces at the marina drop-off for users of the marina, fishing pier, and adjacent park land. A parking waiver is sought for the marina. See Sec. 8.1.15 for waiver details. **(Affirmative finding)**

Sec. 8.1.9, Maximum Parking Spaces

This section limits surface parking to 125% of the Neighborhood Parking District minimum parking requirement. As noted above, the minimum standard parking requirement will not be met. A parking waiver is requested. The proposed parking is nowhere near the maximum limitation. **(Affirmative finding)**

Sec. 8.1.10, Off-Street Loading Requirements

Loading and un-loading area will be available in the marina yard. **(Affirmative finding)**

Sec. 8.1.11, Parking Dimensional Requirements

Proposed parking spaces are dimensionally compliant at 9' X 20.' Back-up space is 20,' whereas 24' is the standard. While less than the standard distance, 20' affords the minimum required 10' dual aisle space within the parking lot. **(Affirmative finding)**

Sec. 8.1.12, Limitations, Location, Use of Facilities

(a) Offsite parking facilities

(Not applicable)

(b) Downtown street level setback

The proposed parking lot is set back from Penny Lane to afford space for a new pedestrian sidewalk that will provide access to the marina and adjacent waterfront amenities.

(Affirmative finding)

(c) Front yard parking restricted

(Not applicable)

(d) Shared parking in the Neighborhood Parking Districts

(Not applicable)

(e) Single story structures in Shared Use Districts

(Not applicable)

(f) Joint use of facilities

The new 68-space parking lot will serve both marina patrons and the general public. The existing parking lot between the Coast Guard and the Water Department building will be modified to result in a net new 4 spaces. This lot will serve both city employees and employees of the marina. **(Affirmative finding)**

(g) Availability of facilities

None of the proposed parking will be used for the storage or display of vehicles or materials by offsite users. Parking will be for visitors to onsite uses only. **(Affirmative finding)**

(h) Compact car parking

(Not applicable)

Sec. 8.1.13, Parking for Disabled Persons

The site plan depicts several handicap parking spaces in the new 68-space parking lot and in close proximity to the marina and the newly established Waterfront Park North. Associated striping is also shown. ADA compliance is administered via the city's building permit process.

(Affirmative finding as conditioned)

Sec. 8.1.14, Stacked and Tandem Parking Restrictions

(Not applicable)

Sec. 8.1.15, Waivers from Parking Requirements / Parking Management Plans

The parking waiver request for the marina has been modified. As noted above, the Community Sailing Center will pursue separate parking arrangements. During peak times (weekends and holidays) the marina requests a 32-space parking waiver. Rather than use 80 parking spaces, 48 spaces (42 within the 68-space lot) are requested (40% waiver). During weekdays, the marina requests a 51-space parking waiver. Only 29 spaces would be used (64% waiver). The waiver request is simple and reasonable. Of the 160 boat slips proposed, only 96 will be seasonal. Seasonal users will keep their boats here and will typically arrive onsite by land. The other 64 slips will be transient. Transient users will arrive by boat and will not need car parking. The 48 parking spaces proposed amount to 0.5 space per seasonal boat slip – the minimum parking standard. The waiver increases during off-peak times due to reduction in use of the marina as

demonstrated in the traffic study. The 29 spaces effectively result in 0.3 spaces per seasonal boat slip. Under both scenarios (peak and off-peak times), remaining parking spaces within the 68-space lot will be available for public use.

The applicants should be prepared to report back to the Planning & Zoning Department each year for 3 years as to the actual onsite parking demand. **(Affirmative finding)**

Sec. 8.2.5, Bicycle Parking Requirements

The proposed marina will require at least 10 short term bike parking spaces and 1 long term bike parking space. The site plan indicates locations for these facilities, and additional details were provided at the March 21, 2017 public hearing. The short term spaces will be provided with racks at the southeast corner of the new park space, and the long term spaces will be provided at the southwest corner of the site within one of the containers. **(Affirmative finding)**

Article 10: Subdivision

Sec. 10.1.15, Lot Line Adjustments

No subdivision is included in this proposal. Lot lines; however, will be adjusted. Two of the three parcels involved will be modified. As required, a boundary survey by a VT licensed land surveyor has been provided, albeit in draft form. The endorsement block needs to be corrected to indicate the signature of the Zoning Administrator per this criterion. No nonconforming parcels result from the proposed lot line adjustments. There is no minimum lot size requirement in the DW-PT zone. A mylar of the lot line adjustment, signed by the Zoning Administrator, shall be filed within the city's land records within 180 days of approval. **(Affirmative finding as conditioned)**

II. Conditions of Approval

1. **Prior to release of the zoning permit**, revised project plans depicting the following shall be submitted, subject to staff review and approval:
 - a. Specification of waterproof cover for the proposed pump station;
 - b. Specification for strapping to hold the underground storage tank in place during times of flooding; and,
 - c. Corrected endorsement block (for Zoning Administrator's signature) on the lot line adjustment.
2. **Within 180 days of this approval**, a mylar copy of the lot line adjustment, with signature of the Zoning Administrator, shall be filed in the land records. Failure to do so shall render this subdivision approval null and void.
3. Per the requirements of Sec. 3.2.10, *Performance Bond of Financial Surety*, a performance guarantee for all new public improvements shall be provided, subject to review and approval by the City Attorney.
4. For the parking waiver, the applicants shall to report back to the Planning & Zoning Department each year for 3 years from the date of this approval as to the actual onsite parking demand.
5. At least **7 days prior to the issuance of a certificate of occupancy**, the applicant shall pay to the Planning & Zoning Department the impact fee as calculated by staff based on the gross square footage of the proposed development.
6. Days and hours of operation are approved as follows (from May 15 – October 15):
The marina and fuel dock will be open for business from 7am-6pm Sun-Thurs and 7am-8pm Friday, Saturday, Holidays and the day preceding a holiday. The public restrooms will be

open and available to the public from 8am-5pm Sun-Thurs and 8am-7pm Friday and Saturday. The outer perimeter wave attenuating dock will be open to the public from 7am to 10pm.

7. Days and hours of construction are limited to Monday – Friday 7:00 AM – 5:00 PM. Saturday construction within those hours may be allowed upon request to the DRB. No construction activity on Sunday.
8. Per Sec. 4.5.4, (f) 8, construction within the Special Flood Hazard Area is subject to the following conditions:

C. All development:

- (i) New construction and/or substantial improvements to structures shall be reasonably safe from flooding and be:
 1. Designed and adequately anchored to prevent flotation, collapse, or lateral movement during the occurrence of the base flood;
 2. Constructed of materials resistant to flood damage;
 3. Constructed by methods and practices that minimize flood damage; and
 4. Constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding;
- (ii) All development shall be designed to minimize flood damage to the proposed development and to public facilities and utilities;
- (iii) All development shall be designed to provide adequate surface drainage to reduce exposure to flood hazards;
- (iv) All new construction and substantial improvements that have fully enclosed areas below the lowest floor shall:
 1. Be solely used for parking of vehicles, storage, or building access, and such a condition shall clearly be stated on any permits; and,
 2. Be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Such designs must be certified by a registered professional engineer or architect, or meet or exceed the following minimum criteria: A minimum of two openings of two walls having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters;
- (v) All necessary permits shall be obtained from those governmental agencies from which approval is required by federal or state law.

D. Residential Development:

- (i) Not applicable.

E. Non-Residential Development:

- (i) All new construction and substantial improvements for nonresidential purposes shall have the lowest floor, including basement, elevated one foot or more above the base flood elevation. Existing non-residential structures may be flood proofed where designed to be watertight to one foot or more above the base flood elevation, with walls substantially impermeable and with structural components having the capability of resisting hydrostatic and

hydrodynamic loads and effects of buoyancy. A permit for a proposed building to be flood proofed shall not be issued until a registered architect or engineer has reviewed the structural design, specifications and plans and has certified that the design and methods of construction are in accordance with meeting the provisions of this subsection.

F. Water Supply Systems:

New and replacement water supply and sanitary sewer systems shall be designed so as to prevent the infiltration of floodwaters into the systems and discharge from the systems;

G. On-Site Waste Disposal Systems:

Not applicable;

H. Recreational Vehicles:

(i) Not applicable.

9. A State of Vermont wastewater permit is required.
10. All new utility lines shall be buried.
11. It is the applicant's responsibility to comply with all applicable ADA requirements.
12. All new construction is required to meet the Guidelines for Energy Efficient Construction pursuant to the requirements of Article VI. Energy Conservation, Section 8 of the City of Burlington Code of Ordinances.
13. Any outdoor signage will require a separate sign permit.
14. Standard Conditions 1-15.

BURLINGTON DPW - WATER SYSTEM REVIEW

BHM_water&sewer_review042417

PROJECT: Burlington Harbor Marina (BHM)

LOCATION: 235 Penny Lane

OWNER: BHM LLC

ENGINEER: Civil Engineering Associates

DATE REC'D: 3/21/17

DATE REV'D: 3/21/17

PLAN DATE/REV: 4/24/17

REV'D BY: S. Roy

	Yes	No	N/A	Insuff. Info
1. Are the water mains located under/adjacent to the proposed street(s)?	☒	☐	☐	☐
2. Are the public water mains C900 pipe, 8" minimum with tracer wire?	☒	☐	☐	☐
3. Is the depth of all water mains between 6' and 9' below grade?	☒	☐	☐	☐
4. Does the proposed design avoid 90 degree bends?	☒	☐	☐	☐
5. Does the proposed design include dead ends?	☒	☐	☐	☐
6. Do new tee connections include valves on all three legs?	☒	☐	☐	☐
7. If the mains are shown bending vertically or horizontally, do they conform to allowable pipe deflection radii?	☐	☐	☒	☐
8. Do all mains meet horizontal and vertical separation from sewers?	☒	☐	☐	☐
9. Are fire hydrants located every 500' residential and 300' commercial?	☒	☐	☐	☐
10. Are there fire hydrants located within 100' of a sprinklered building?	☐	☐	☒	☐
11. Are fire hydrants set back at least 3' from paved areas?	☒	☐	☐	☐
12. Do fire hydrants meet City specifications?	☐	☒	☐	☐
13. Are the fire hydrants connected to main with 6" pipe and valve?	☒	☐	☐	☐
14. Are there hydrants at high point(s) to aid in air removal?	☐	☐	☒	☐
15. Are there mechanical thrust restraint and thrust blocks at all fittings?	☒	☐	☐	☐
16. Do all valves meet City specifications (open right)?	☐	☒	☐	☐
17. Are all valves and curbstops located within City right-of-way?	☒	☐	☐	☐
18. Are there any special easement requirements on this project?	☒	☐	☐	☐
19. Do all valves include a valve box at grade w/covers marked "water"?	☒	☐	☐	☐
20. Are all services up to 2" using type K copper or CTS pipe?	☒	☐	☐	☐
21. Do all services leave water mains and enter buildings at right angles?	☐	☐	☒	☐
22. Do the plans include a water system specifications drawing?	☒	☐	☐	☐
23. Do the plans include water use estimates using the applicable table from the latest Vermont Environmental Standards?	☐	☐	☒	☐
24. Is the project large enough to require Needed Fire Flow (NFF) and/or hydraulic analysis for domestic and fire flow demands, or to prove whether or not the project may have an adverse impact to existing customers?	☐	☒	☐	☐
25. Does or should (circle one) the design include a looped water system?	☐	☐	☒	☐
26. Do multifamily dwellings have means for separate metering?	☐	☐	☒	☐
27. Do the plans include standards for pressure testing and disinfection?	☒	☐	☐	☐

COMMENTS

1. Water Resources is now using a Burlington specified Kennedy K81 hydrant. We will provide the applicable information.
2. Gate valves at tapping tee and hydrant are open right.

3. Sheet C2.2 references protection of the water plant's 30" clearwell pipes per the Dufresne Report. This needs to be designed, approved and constructed before the permeable pavers are installed.
4. Water Resources has no experience with above-grade water systems (marina end) and cannot approve that design.

BURLINGTON DPW - SEWER SYSTEM REVIEW

PROJECT: Burlington Harbor Marina (BHM) LOCATION: 235 Penny Lane
 OWNER: BHM LLC ENGINEER: Civil Engineering Associates
 DATE REC'D: 3/21/17 DATE REV'D: 3/21/17
 PLAN DATE/REV: 1/13/17 REV'D BY: S. Roy

	Yes	No	N/A	Insuff. Info
1. Are the sewers located under the proposed street(s)?	☐	☐	☒	☐
2. Are the sewer pipes SDR 35 PVC or approved equal?	☐	☐	☒	☐
3. Are the pipe depth(s) between 4 ft to 8 ft, or approved?	☐	☐	☒	☐
4. Are the sewer pipes sealed at the manholes?	☐	☐	☒	☐
5. Do the service connections meet DPW standards?	☐	☒	☐	☐
6. Are manholes located at changes in direction or grade?	☐	☐	☒	☐
7. Are manholes every 400 to 600 feet, depending on sewer size?	☐	☐	☒	☐
8. Are manholes precast w/plastic rungs and cover marked "sewer"?	☐	☐	☒	☐
9. Do the manholes have adequate invert(s) and bench?	☐	☐	☒	☐
10. Does the project plans include ave. and peak estimated flows?	☐	☐	☐	☒
11. Does this project discharge into a combined sewer system?	☒	☐	☐	☐
a. If yes, is a capacity study warranted?	☐	☐	☒	☐
12. Does this project discharge to a pump station?	☒	☐	☐	☐
a. If yes, is a capacity study warranted?	☐	☐	☒	☐
b. Does the station have adequate emergency storage for this project?	☐	☐	☒	☐
13. Does the project require construction of a new pump station?	☒	☐	☐	☐
a. If yes, does DPW want to take it over?	☐	☒	☐	☐
b. If the developer wants DPW to own, does the station meet State and DPW standards?	☐	☐	☒	☐

Station type:Click here to enter text. Capacity:Click here to enter text.

COMMENTS

1. Per item #5 above, detail for project force main connection on sheet C4.1 is incorrect for this project.
2. Force main material of construction is unclear.
3. Water Resources has no experience with floating wastewater systems (marina end) and cannot approve that design.



State of Vermont
PERMIT AND LICENSE INFORMATION

UNDERGROUND STORAGE TANKS

**SUMMARY
DESCRIPTION
OF PERMIT**

A permit is required to be obtained by any owner or operator of a "Category One Tank." A Category One Tank includes any underground storage tank (UST) except those used for the storage of fuel oil exclusively for on-premises heating purposes and farm or residential tanks used for storing motor fuel. Underground storage tanks containing heating fuel that is used for manufacturing or processing purposes are included in the definition of a Category One Tank.

**EXAMPLES OF
REGULATED
ACTIVITY**

A retail gasoline station; a hospital with an emergency generator; service station with an used oil tank.

**CRITERIA FOR
JURISDICTION**

Any person who owns, operates or installs a category one UST, as defined by 10 V.S.A. §1922 (11) and Subchapter 2 Definitions of the UST Rules adopted 10/1/2011.

Registration Jurisdiction:

- 1) New USTs: Any person who brings an UST into service shall notify the Agency prior to construction;
- 2) USTs Currently In-Service: Any person who owns an UST currently in-service must register; and
- 3) USTs No Longer In-Service: Any person who owned or used an UST that was removed from service after January 1, 1974, and who does not have knowledge that the tank has been removed from the ground must notify the Agency.

Exemptions to Registration Requirement: 1) Farm or residential motor fuel USTs which are less than or equal to 1100 gallons in capacity used for non-commercial purposes; and 2) heating oil tanks used for on-premises heating purposes which are less than or equal to 1100 gallons in capacity.

**INFORMATION
REQUIRED**

Registration and an application for a permit can be accomplished by the completion of a UST Form (five parts). The form requires information concerning details of the tank owner, the tank operator, the contact person, the landowner, name and location of facility, removal of tank information, tank-specific information, sketch map with specific information noted, town highway map used as a location map, evidence of financial responsibility for corrective action and third party compensation in case of release from any part of a tank system. A facility with multiple tanks can apply for a single permit.

WEB ADDRESS

<http://www.anr.state.vt.us/dec/wastediv/ust/home.htm>

FEES

Registration of UST is recorded in the local land records. A check for \$10 made payable to the town or city clerk in which the facility is located must accompany the UST Form when forwarded to the VT DEC for processing.

The annual permit fee is \$125 per tank per year. Municipalities (including school districts) are exempt from payment of the annual permit fee. Construction permits are issued for one year, Operating renewal permits are issued for a term not exceeding five years. Invoices for annual permit fees are issued by the VT DEC in the anniversary month that the permit is issued.

**APPLICATION
TIME FRAME**

The established performance standard for processing a completed application is 60 days for a construction permit and 30 days for an operating from the date of receipt of a completed application. Any incomplete applications will be returned to the applicant and the time clock will commence with receipt of a completed application.

For existing UST facilities the applicant should allow 15 business days for processing a renewal permit application.

For construction permits the application should allow 30-60 business days for processing.

**ADMINISTERING
AGENCY**

AGENCY OF NATURAL RESOURCES DEPARTMENT OF ENVIRONMENTAL CONSERVATION WASTE MANAGEMENT DIVISION UST Program	
CONTACT:	June Reilly, UST Permit Administrator Phone: 802-522-0231 june.reilly@state.vt.us
ADDRESS:	1 National Life Drive, Davis 1 Montpelier, VT 05620-3704
eDEC:	www.securevtanr.com (renewal of permit can apply online)

AUTHORITY

10 VSA §§ 1922, 1923, 1927, 1929, 1930.

**APPLICABLE
RULES**

Vermont Underground Storage Tank Rules adopted 10/1/2011.

**APPEAL
PROCESS**

If a permit is denied, a written statement of reasons will be supplied to the applicant. Within 30 days of the date of an act or decision, any person aggrieved by an act or decision of the secretary, or any party by right, may appeal to the environmental court in accordance with the provisions of [10 VSA Chapter 220](#).

OTHER PERMITS

The Dept of Public Safety, Fire Safety Division requires a one-time plan review for all of the above ground equipment, including dispensing islands ([Sheet #49](#)). Also see Dept. of Agriculture ([Sheet #88](#)) and Act 250 ([Sheet #47](#)). Contact a Permit Specialist for a Project Review Sheet.

<http://www.anr.state.vt.us/dec/ead/pa/index.htm>

Burlington Harbor Marina

January 27, 2017

Mr. Scott Gustin
Senior Planner
Burlington Dept. of Planning & Zoning
149 Church St.
Burlington, VT 05401

Re: Request for Lot Line Adjustment – 234 Penny Lane

Dear Scott,

Attached is a zoning permit application for construction of a new 160 slip public marina facility on approximately .6 acres of waterfront land to be leased from the City of Burlington. The leased lot will be created through a lot line adjustment described herein. Upland improvements include demolition of the existing pavilion and creation of a marina yard area with (2) gatehouse entrances to the new dock system, (2) modified storage containers for workshop and storage, underground fuel tank, and underground utility connections. A new plaza area for temporary drop off and accessible parking is proposed adjacent to the fishing pier including a new flagpole, landscaping and site lighting. A new waterfront park is proposed in the location of the current parking area adjacent to the Community Sailing Center and fishing pier. Parking for the project will be provided in a 68 space newly constructed lot in the location of the currently permitted 73 space lot under the WFN improvements permit.

The project components are located on 3 separate parcels so an application form is included for all 3. The proposed plat showing the lot line adjustment is included along with a letter requesting same from the City.

The attached fee was calculated as follows:

\$959,000 of upland site construction/1000 x \$2 =	\$1,918
Permit filing fee	\$ 110
Lot Line Adjustment 2 lots x \$100	= \$ 200
Total	\$2,228

Traffic

A traffic study was requested by DPW and is attached.

Burlington Harbor Marina

Lighting

A lighting plan and photometric analysis is attached. The chosen fixtures match the fixtures utilized in the roadway and park areas of the WFN project.

Parking

We are requesting a parking waiver to reduce the required number of spaces from 80 at .5 per berth to 48. The request is based on the following: (i) the maximum number of seasonal slips permitted in the Agreement with the City is 96 (60% of 160), reducing the requirement for parking spaces to 48 (.5 per slip); and (ii) the users of the 64 transient boat slips are less likely to need parking, as they arrive at the Marina by boat. 42 of the 48 spaces are located in the proposed 68 space 'East Lot' with the remaining 26 available for allocation to the Community Sailing Center.

Please let me know if you have any questions on how any of the other Site Plan Review Standards were addressed in the plan.

Signed,

Jack Wallace
Managing Member
Burlington Harbor Marina, LLC

Enc

Cc CEDO

~~BURLINGTON HARBOR MARINA~~

~~LEP Permit Application~~

~~December 22, 2016~~

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VIEW IN RENDERING

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VIEW OF PARK



DOCK ACCESS POINT

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WATER TREATMENT PLNT AND PAVILION

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SUBJECT MARINA SITE



EXISTING USCG BUILDING AND BREAKWATER ADJACENT TO SITE



USCG BUILDING AND BREAKWATER



ADJACENT FISHING PIER AND SAILING CENTER FACILITIES NORTH OF SITE



ADJACENT FLOATING ATTENUATOR AT COMMUNITY SAILING CENTER



ADJACENT SHORELINE STRUCTURES



DOWNTOWN BURLINGTON WATERFRONT



TRAFFIC IMPACT STUDY

WATERFRONT NORTH MARINA

9.14.2016



PREPARED FOR:
BURLINGTON HARBOR MARINA, LLC

SUBMITTED BY:
RSG

180 Battery Street, Suite 350
Burlington, VT 05401
802.383.0118
www.rsginc.com



WATERFRONT NORTH MARINA

PREPARED FOR:
BURLINGTON HARBOR MARINA, LLC

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1.0 SUMMARY OF KEY FINDINGS

Burlington Harbor Marina, LLC has retained RSG to conduct a traffic impact study to understand and assess the effects of its proposed Burlington Harbor Marina in the Waterfront North area of Burlington, Vermont.

The proposed project would construct a 160 boat slip marina with 96 slips reserved for seasonal rentals and 64 slips for transient users arriving by boat. The Marina will be open May through October.

Key project findings, presented in greater detail below, include:

- Based on the expected vehicle demand for the 96 seasonal berth rentals the Marina is expected to generate 20 trips during the weekday PM peak hour and 26 trips during the Saturday peak hour.
- During the weekday PM peak hour, we project the addition of site generated traffic to the adjacent road network will increase delays on local roadways by less than 1 second or less in both 2018 and 2023.
- Acceptable overall and movement delays for the study intersections are expected with or without the addition of project generated traffic during both the weekday and Saturday peak hours.
- Acceptable queues are expected for all study intersection movements, although an increase of three car lengths is anticipated in 2023 during the Saturday peak hour at the southbound approach to College Street – Lake Street.

We conclude the proposed project will not cause undue adverse traffic congestion or safety conditions and will not unnecessarily or unreasonably endanger the public investment in roads, highways, and related infrastructure.

2.0 INTRODUCTION

Burlington Harbor Marina, LLC has retained RSG to conduct a traffic impact study to understand and assess the effects of its proposed Burlington Harbor Marina in the Waterfront North area of Burlington, Vermont. Waterfront North currently consists of a variety of land uses, several of which will be affected by the development of the Marina, which is expected to open in time for the 2018 boating season. This report is a summary of findings pertaining to the direct and indirect traffic impacts of the proposed Marina.

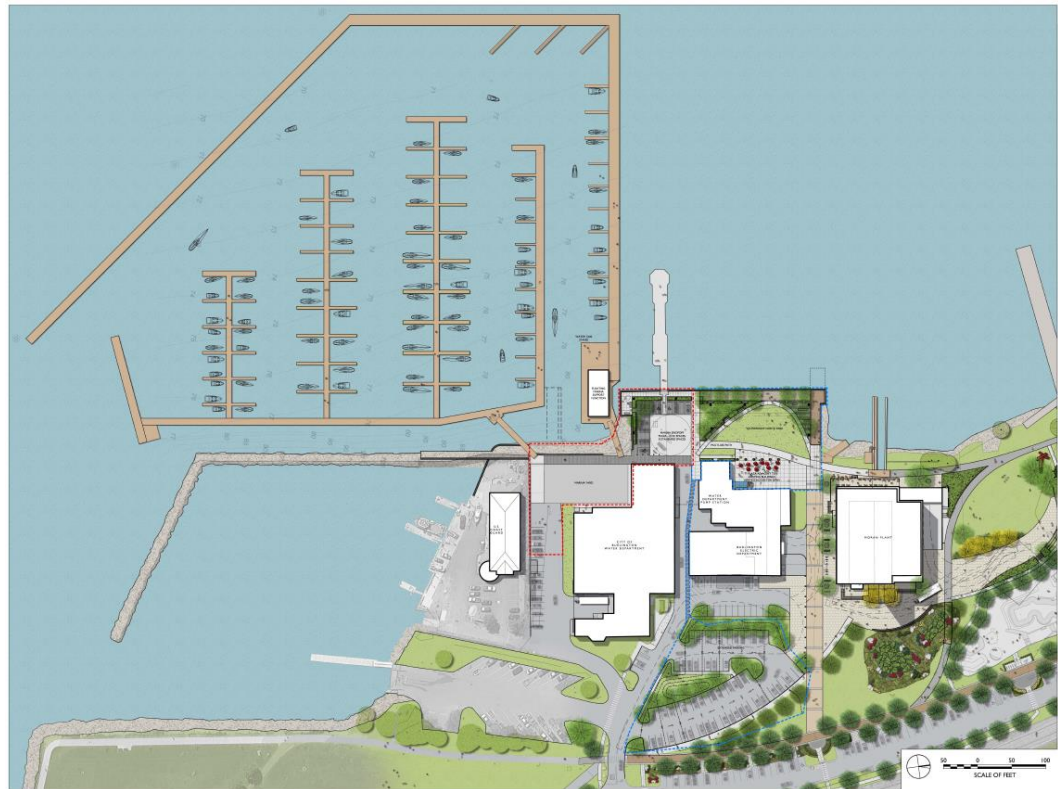
2.1 | PROJECT DESCRIPTION

The proposed Burlington Harbor Marina and associated developments will include:

- 160 boat slips
 - 96 slips for seasonal boaters (rented on a seasonable basis)
 - 64 slips for transient boaters
- Short-term / Drop-off parking area
- Public park/plaza adjacent to fishing pier
- Marina parking for employees
- Marina parking for boaters
- Floating Marina facility
 - Offices
 - Public restrooms
 - Bathing/laundry for guests
 - Store & chandlery
- Other Marina support and services, including fuel pumpout facilities, dockmaster facility, and boat launching
- Wave attenuation system

An illustrated site plan is shown in **Figure 1**.

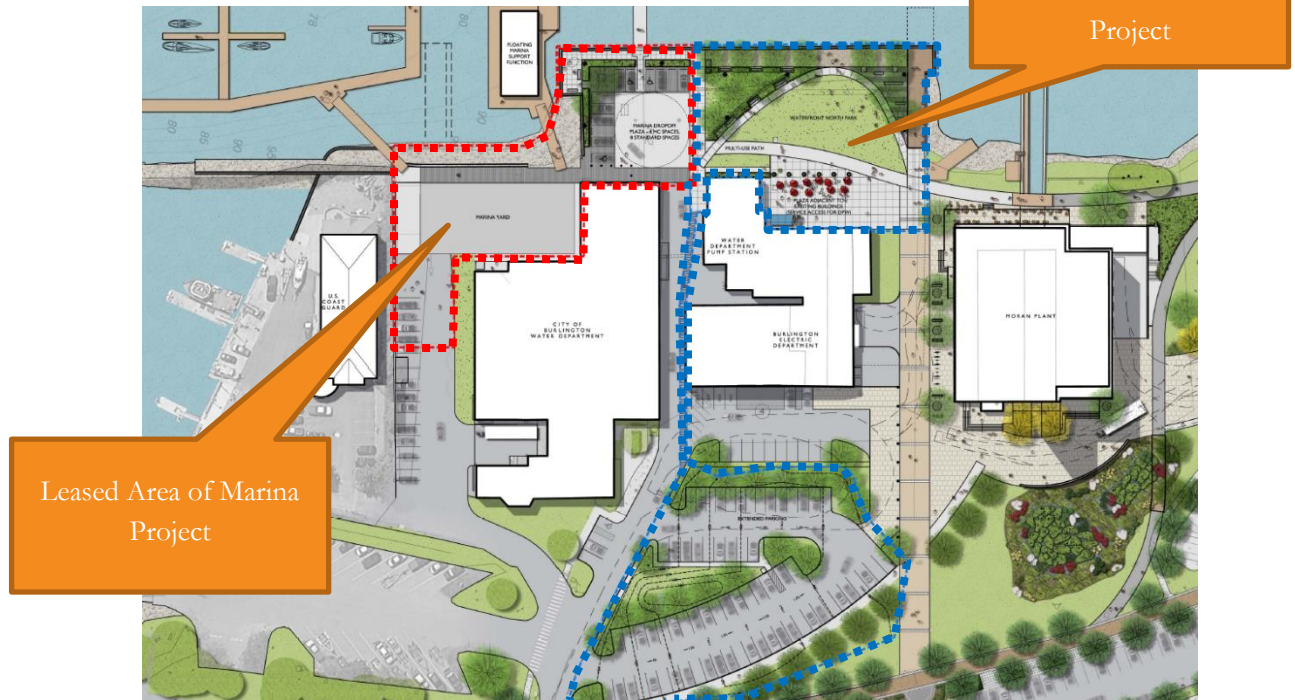
FIGURE 1: BURLINGTON HARBOR MARINA SITE PLAN



Burlington Harbor Marina, LLC will lease land from the City for the Marina yard, employee parking spaces, and the drop-off area, outlined in red in the zoomed-in plan shown in **Figure 2**. The remaining area, outlined in blue, is outside of the area controlled by the lease but will be constructed by the Marina project. These areas include Marina visitor parking, the public park/plaza, and a pedestrian connection between the two areas.

All existing buildings, the Coast Guard grounds, and the public boat launch lot will remain where they are.

FIGURE 2: ZOOMED-IN PLAN OF BURLINGTON HARBOR MARINA



2.2 | PROJECT CONTEXT

The City of Burlington, Vermont, borders Lake Champlain, a lake situated primarily between New York and Vermont. To the west of the lake are the Adirondack Mountains, and to the east are the Green Mountains, giving those on the shore and on the water cherished views. Recreation on the water includes fishing, swimming, and boating - for canoes, kayaks, paddle boards, sailboats, and motorboats alike.



View of Lake Champlain from Burlington

Outside of Burlington's downtown core and dense residential areas, a number of public beaches and parks line much of the shoreline. In addition, an eight-mile bike path runs parallel to the lake for the entire length of the City. Within the urban part of Burlington, there are a number of waterfront attractions, including restaurants, boating docks, fishing spots, picnic and playground areas, and other amenities that allow people to access the water itself and have views of the water and its backdrop.

The northern portion of the Burlington waterfront - called Waterfront North - is in the midst of revitalization improvements led by the City of Burlington, collectively called Waterfront Access North (WAN). This area, which is owned by the City, includes the area north of Waterfront Park and west of the railroad. The WAN site plan, created before financing was approved for the Marina, is shown in **Figure 3**.

FIGURE 3: WATERFRONT ACCESS NORTH SITE PLAN, 2014



Within this Waterfront North area, Burlington Harbor Marina, LLC intends to lease land from the City to build a 160-slip Marina, to be open for business in the summer of 2018. Currently, there are two small on-water boating storage locations in the City - at the Community Boathouse (College Street) and Perkins Pier (Maple Street). The proposed Burlington Harbor Marina would have larger capacity than the existing Marinas and will involve redevelopment of Waterfront North to include additional surface car parking, as well as a formalized park immediately adjacent to the water.

3.0 EXISTING CONDITIONS

3.1 | LAND USE

Waterfront North is the site of a variety of uses that attract a variety of users. It is zoned as Mixed Use: Downtown Waterfront - Public Trust, a district “intended to enhance and diversify commercial and residential development in the downtown waterfront area, and to increase access, utilization, and enjoyment of the lakeshore by the community.”

Existing uses and layout of Waterfront North are shown in **Figure 4**.

FIGURE 4: WATERFRONT NORTH EXISTING LAYOUT



DESCRIPTIONS OF USES

- The **US Coast Guard** has had a unit at this location, Station Burlington, since 1948. The 25 enlisted staff members at Station Burlington provide Lake Champlain with Search and Rescue (including ice rescue), Enforcement of Laws and Treaties, and

aid to navigation. The existing three-floor building was commissioned in 1993. A locked gate prevents the public from entering the grounds.

- The **City of Burlington Water Department** has offices and a pump station here. The pump station shares a building with the Electric Department, and its garage is used by the Community Sailing Center.
- The **City of Burlington Electric Department** houses the backup generators for the city and includes bulk fuel storage. These result in modest operational and transportation demands.
- The **Community Sailing Center** (CSC) is a non-profit organization that offers lessons, programs, and rentals for sailing, paddleboarding, kayaking, and canoeing. It has been operating at its current location for over 20 years, but it is expected to relocate soon; the CSC currently has a permit to build a new and larger (22,180-square foot) facility north of the skatepark.
- The **Moran Plant** was built in 1953 and was an active coal-fired power plant from 1954 to 1986. A number of new uses have been considered since the plant closed, but the building remains vacant except for a small area used by the CSC. Given the current development plan status, the Moran Plan will not be considered in this traffic study.
- The **Andy A_Dog Williams Skatepark** was built in November 2015, replacing a run-down skatepark built 14 years prior. The new skatepark is a significant draw to Waterfront North.

3.2 | SITE ACCESS

With more attractions in the project area, it is likely that motor vehicle, pedestrian, and bicycle traffic to the project area will increase. Access for each of these modes is described below.

Within the project area itself, there will be a painted walkway between the two City utility buildings to designate a safe route for pedestrians and bicyclists through the project area. It is anticipated that this walkway will be the way in which the majority of users will travel from their access points to the waterfront.

MOTOR VEHICLES

Waterfront North is primarily only accessible to motor vehicles via **Lake Street**, which extends south to College Street.

Depot Street, which connects the area to North Avenue, is used for local traffic, event egress, and emergency vehicle access to the waterfront.

The majority of vehicles associated with the project will use the parking designated for the Marina, with a small fraction of them using the short-term parking option at the water edge as a loading/unloading zone.

BICYCLES

Bicycles can access Waterfront North via:

- **Lake Street** (On-road; no bicycle facilities)
- **Depot Street** (Generally no motor vehicles allowed)
- **Island Line Trail / Burlington Bike Path** (Non-motorized transportation only)

The Burlington Bike Path runs parallel to the lake between Oakledge Park at the southern end of the City and the Winooski River at the northern end of the City. Despite the name, it is open to forms of non-motorized transportation other than bicyclists, including walkers, runners, and roller skaters. The bike path is extremely popular among locals and tourists alike, especially in the summer. This path not only connects the parks, beaches, residential areas, and other attractions along the waterfront, but it is part of the longer Island Line Trail, which extends through Colchester and up to the island of South Hero.

PEDESTRIANS

Pedestrians can access Waterfront North via:

- **Lake Street** (sidewalk on the east side)
- **Depot Street**
- **Island Line Trail / Burlington Bike Path**
- A concrete **walking path** that connects to the **boardwalk** north of College Street

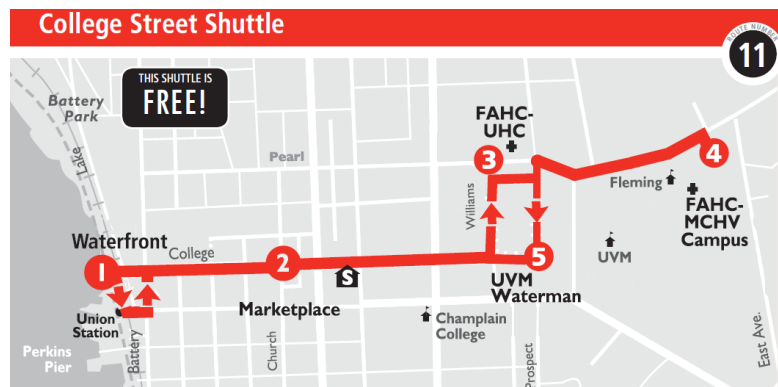
TRANSIT

There are two bus lines that make stops near Waterfront North:

The **City Loop** bus (Route number 8) stops at the intersection of Battery Street and College Street, approximately 0.35 miles from Penny Lane. It generally runs once every half hour.



The free **College Street Shuttle** (Route Number 11) stops at the intersection of College Street and Lake Street, approximately 0.3 miles from Penny Lane. It generally runs once every 15 minutes.



3.3 | EXISTING PARKING

Within Waterfront North, there is a mix of designated parking, managed parking, and free, unlimited public parking. There are a number of parking lots, as well as on-street parking on the newly constructed segment of Lake Street north of Penny Lane.

A NOTE ABOUT LAKE STREET: Prior to construction of the new segment of Lake Street, Lake Street terminated at the intersection of Penny Lane and Depot Street. While the Penny Lane street sign remains at the Depot Street intersection, for the purposes of

this report, Penny Lane now begins to the west of the new segment of Lake Street; in other words, the old and new segments of Lake Street are not interrupted by Penny Lane.

The new segment of **Lake Street**, which dead-ends just past the skatepark, has 96 parking spaces. These spaces are used primarily by people accessing the waterfront for recreational purposes, as opposed to the utility department buildings.

Employees and customers of the **Water Department** and **Electric Department** are assigned to specific lots and spaces, which are all open to the public outside of normal business hours. These lots have signs stating their allowed uses.

The **Coast Guard** has its own private lot, which is closed to the public.

The **boat launch** lot is intended only for cars who have launched a boats. Launching costs \$10.

The **Community Sailing Center** does not have signage restricting parking spaces for its users, so it effectively shares parking spaces with visitors accessing the fishing pier and the green space along the water. There are 35 spaces in the lot between the sailing center and the lake, which are primarily used by sailing center visitors, in addition to visitors to the pier and green space.

Figure 5 shows the existing parking layout. Only spaces and lots with callouts have signage that restricts parking.

FIGURE 5: EXISTING PARKING



3.4 | PROPOSED PARKING SUPPLY

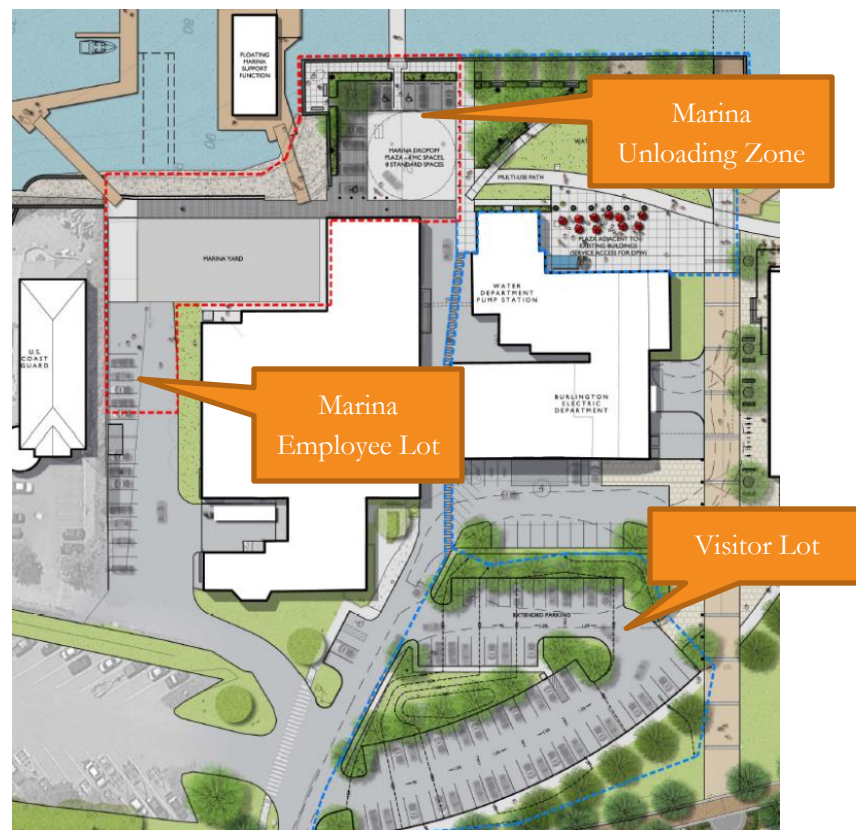
MARINA PARKING SUPPLY

The Marina project will construct the following new parking areas:

- **Marina Unloading Zone: 12 spaces** (adjacent to the fishing pier)
 - o 2 handicapped parking spaces for Marina use
 - o 2 handicapped spaces at the entrance to the fishing pier
 - o 8 general spaces for temporary, short-term parking
- **Employee Lot: 4 spaces** (south of the Water Department building)
 - o 4 spaces reserved for employees of the Marina
- **Visitor Lot: 68 spaces** (east of the project site and west of the bike path)

- 42 spaces reserved for the Marina
 - 23 of the reserved spaces are exclusive seasonally reserved spaces (May through October)
 - 19 of the reserved spaces for weekend and holiday use within the season
- 26 spaces for non-Marina users

FIGURE 6: PROPOSED PARKING



The parking reserved for Marina use provide 48 parking spaces in total. This is in line with the City's zoning regulations of 0.5 parking spaces per slip based on the 96 seasonal boat slips. The transient boat slips are assumed to generate a negligible parking demand and therefore do not have dedicated parking spaces.

The proximity of other public parking and excellent non-motorized access, as well as public transit to College Street, provide alternative means of accessing the Marina that do not require parking.

OTHER USERS

The proposed site redevelopment does affect the existing parking supply loosely associated with some of the existing land uses in the area.

The redevelopment of the site and reconfiguration of parking spaces east of the Water and Electric Department buildings reduces the dedicated parking supply from 25 spaces to 20 spaces. Observations made during the collection of traffic and parking data indicate that existing parking demand is less than 20 spaces, suggesting that this reduction can be accommodated.

The sailing center currently has a valid permit for 52 parking spaces. This permit is based on the premise of the redeveloped Moran Plant and the relocated sailing center north of the project site. Currently the 35 spaces west of the Electric Department serve both the sailing center and the waterfront park. While the Moran Plant redevelopment status is unclear, the sailing center relocation is being planned for within this traffic assessment. The parking of the relocated sailing center is proposed to be reduced with a waiver to 26 spaces within the 68 space lot being constructed by the Marina project. The sailing center waiver is being submitted concurrently with the Marina application.

3.5 | SAFETY

SPEED LIMIT

Lake Street has a posted speed limit of 20 mph. South of Penny Lane, when cars are parked in the parallel parking spaces on the east side, vehicles generally travel slower than the speed limit to safely pass oncoming vehicles.

Penny Lane does not have a posted speed, but because of its short length, the numerous entrances to parking lots off of it, and the crossing of the bike path, vehicles tend to travel at very slow speeds.

College Street has a posted speed limit of 25 mph. However, in the segment of College street west of Battery Street, vehicles travel much slower because of how busy the area is and the short distance between crossings.

SIGHT DISTANCE

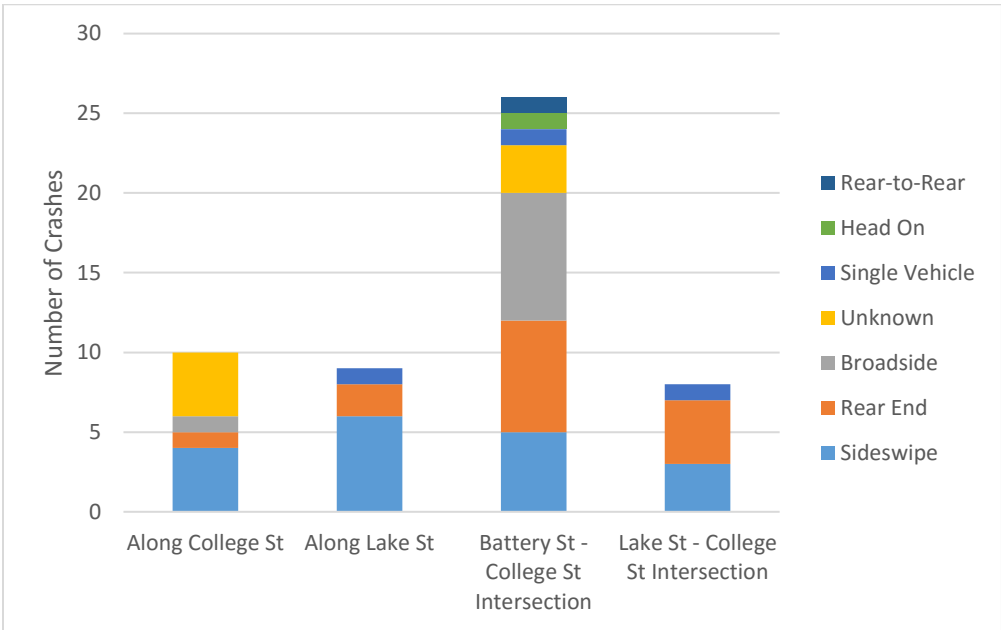
The safe intersection sight distance at the intersection of Penny Lane and Lake Street is in excess of what is required in an urban condition with speeds 20 mph and lower.

CRASH HISTORY

According to the latest (2010-2014) data from VTrans, there are no high crash locations (HCLs) in between the study intersections or in the vicinity of the proposed Marina.

A summary of reported crashes from the past five years is shown in Figure 7. Crashes in parking lots were not considered. There were no reported crashes on Penny Lane.

FIGURE 7: CRASH HISTORY, JULY 1, 2011 - JULY 1, 2016



3.6 | PLANNED DEVELOPMENTS

The **Community Sailing Center** is expected to move to a larger facility just north of the skatepark. The CSC is expanding the size of its physical facility but will not be expanding membership in an amount significant enough to affect this study. In this study, it is assumed that this move will happen by the time the Marina opens in 2018. Thus, traffic associated with the CSC that currently parks in the lot in front of the CSC will continue on Lake Street rather than turn left onto Penny Lane.

The **Moran Plant** has been slated for development since it closed in 1986, and numerous ideas have been proposed, but in the 30 years since, it has not undergone any improvements. As of August 2016, New Moran, Inc. has a permit to redevelop the Moran Plant, but the permit expires on September 17. Due to the Moran Plant's history of plans that have not come to fruition, the nearing permit expiration, and the recent dissolution of the City's memorandum of understanding with New Moran (July 21, 2016), plans for this building are not being included in this study.

4.0 ANALYSIS TRAFFIC VOLUMES

This analysis examines design hour vehicle delays and queues at the following three intersections:

1. Battery Street & College Street
2. Lake Street & College Street/Main Street
3. Lake Street & Penny Lane

FIGURE 8: PROJECT LOCATION AND STUDY AREA INTERSECTIONS



Based on count data, the nature of the proposed use, and discussions with the City of Burlington, it was determined that the PM peak hours and Saturday¹ midday peak hours have the highest combination of background and site generated traffic. Thus traffic impacts during these two time periods are examined in this study. The Saturday peak hour was found using tube data from a 2008 study. Tube data at Battery Street / College Street intersection was from noon to 6pm and reached a peak between 2:15pm and 4:15pm. To be conservative data was collected for the 2:00 – 4:30 PM timeframe.

¹ Laura Wheelock, City of Burlington DPW confirmed Saturday is more active than Sunday in the study area.

4.2 | ANALYSIS SCENARIOS

Vehicle delays and queues are examined first with baseline, **No Build** scenario, traffic volumes, which represent the anticipated design hour conditions in the target study years, 2018 and 2023 without the proposed development in place.

Once baseline conditions are established, anticipated traffic associated with the proposed development is added to the No Build scenario volumes to create **Build** scenario traffic volumes, which are in turn used to project intersection delays and levels of service with the proposed development in place.

A detailed description of the elements that contribute to the No Build and Build scenario traffic volumes is presented below.

4.3 | BACKGROUND TRAFFIC VOLUMES AND ADJUSTMENTS

Traffic count data was collected by RSG during the months of July and August 2016 during non-holiday weekdays and weekend periods.

Following VTrans traffic study guidelines, observed peak hour traffic volumes were adjusted to represent the design hour volume (DHV)² in 2018 and 2023. Design hour adjustment factors are based on VTrans automatic traffic recorder (ATR) D455, located on Battery Street approximately just south of College Street. The calculations to adjust observed traffic volumes to the DHV are as follows:

1. The most recently observed AADT at ATR D455 was 15,000 vehicles in 2013. This AADT was adjusted to 2016 using a growth factor of 1.01, equaling a **2016 estimated AADT of 15,150 vehicles.**
2. The k factor of Battery Street is 0.1061, based on its characterization within the urban poll group. Using this k factor and the 2016 AADT, the $DHV = AADT * k$ leads to a **DHV of $15,150 * 0.1061 = 1,610$ vehicles.**
3. Because ATR D455 is south of the College Street intersection, vehicles in RSG's 2016 Battery Street-College Street traffic count that entered the intersection from the south or exited the intersection heading south were added together. The total number of vehicles from the **peak hour of this count that likely passed ATR D455 are 1,439 vehicles.** The adjustment factor between 1,580 and 1,439 is 1.12.
4. The future 2018 year was selected for full opening. An annual growth rate of 0.5% was used to obtain a two-year growth factor of 1.01. The Battery Street intersection were increased by $1.12 * 1.01 = 13\%$ **to adjust to the DHV.** This growth rate was assumed to continue and is applied to represent the background growth between 2018 and 2023.
5. This adjustment factor was then applied to all study areas intersections.

² The DHV is the 30th highest hour of traffic for the year and is used as the design standard in Vermont.

4.4 | TRIP GENERATION

Trip generation refers to the number of new vehicle trips originating at or destined for a particular development. To estimate the number of new vehicle trips for the proposed Marina, we examined trip generation rates presented in the Institute of Transportation Engineer's *Trip Generation Manual*.³

Applying trip generation rates for ITE Land Use 420 (Marina), the 96 seasonal berth Marina is anticipated to generate approximately 20 new vehicle trips during the PM peak hour and approximately 26 vehicle trips during the Saturday peak hour. **Figure 9** presents the projected trip generation.

FIGURE 9: TRIP GENERATION SUMMARY

Day	Trips/Berth	Trips
Weekday	2.96	284
Saturday	3.22	309
PM Peak Hour	0.21	20
Saturday Peak Hour	0.27	26

Figure 10 and **Figure 11** present a map of the estimated distribution of project-generated trips. Trips entering and exiting the site access are distributed onto the roadway network based on background traffic volumes.

³ Institute of Transportation Engineers, *Trip Generation* 9th Edition (Washington, D.C.: Institute of Transportation Engineers, 2012).

FIGURE 10: DISTRIBUTION OF SITE-GENERATED TRIPS (PM PEAK HOUR)

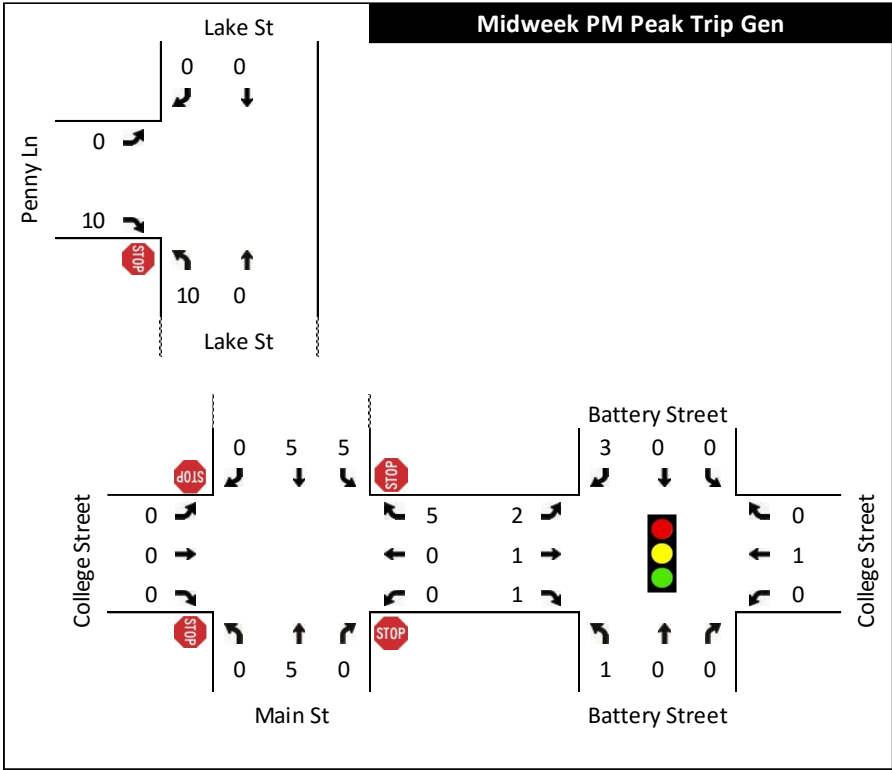
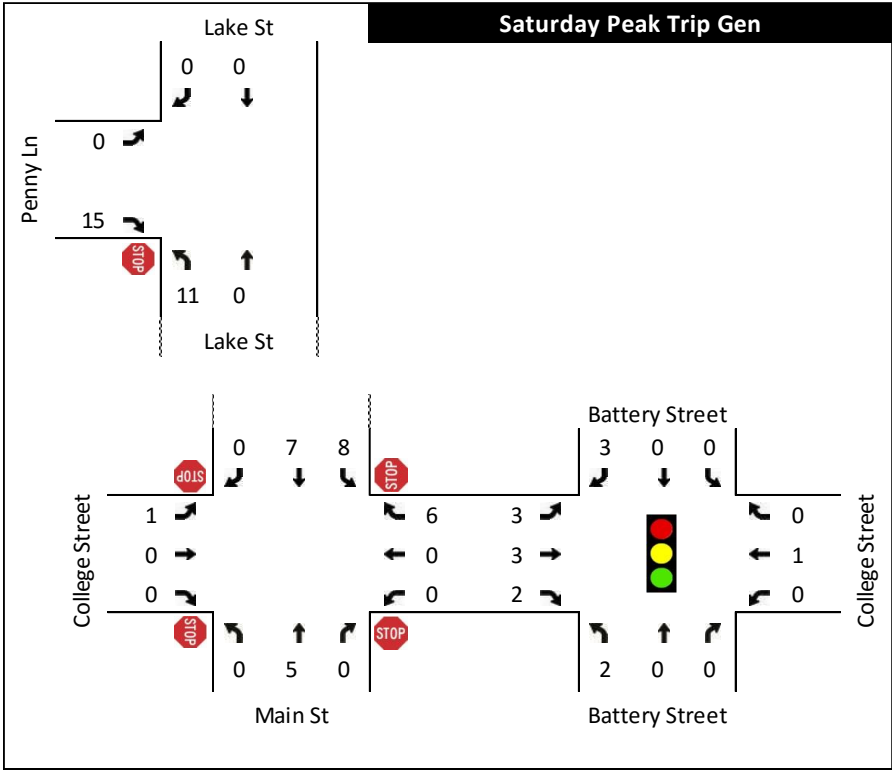


FIGURE 11: DISTRIBUTION OF SITE-GENERATED TRIPS (SATURDAY PEAK HOUR)



4.5 | TRIP RE-DISTRIBUTION

As part of the development of the Marina, parking spaces will be relocated and a new waterfront park/plaza will be built. Those who currently park in one of the parking lots (not on Lake Street) to access the fishing pier or existing green space are expected to instead park on Lake Street once the Marina and new park/plaza area is built. No new trips are expected from the new park/plaza.

Independent of the Marina's development, the Community Sailing Center is expected to relocate north of its current space by the time the Marina is operating. As noted earlier, the CSC will not be expanding membership in an amount significant enough to affect this study. Thus, no new trips to the CSC are being included in this study. However, parking and drop off associated with the CSC will change. Traffic currently associated with the CSC, the fishing pier, and the small waterfront park will use the new 68 space lot and the public parking spaces on Lake Street, with the vast majority continuing onto Lake Street rather than onto Penny Lane.

RSG observed current peak hour users of Penny Lane and estimated that approximately 75% of traffic on Penny Lane was associated with the Sailing Center uses with the remaining 25% associated with park use, fishing pier, and sightseeing. A small number of trips are still estimated to use Penny Lane for dropping off and return to Lake Street to park.

Additionally, the operating hours of the Sailing Center and the parking lot observations suggest that the Sailing Center spaces in the Penny Lane parking lot (68 space lot) would fill up before the PM peak hour.

Figure 12 and **Figure 13** show the estimated re-distribution of existing Penny Lane traffic.

FIGURE 12: RE-DISTRIBUTION OF TRIPS (PM PEAK HOUR)

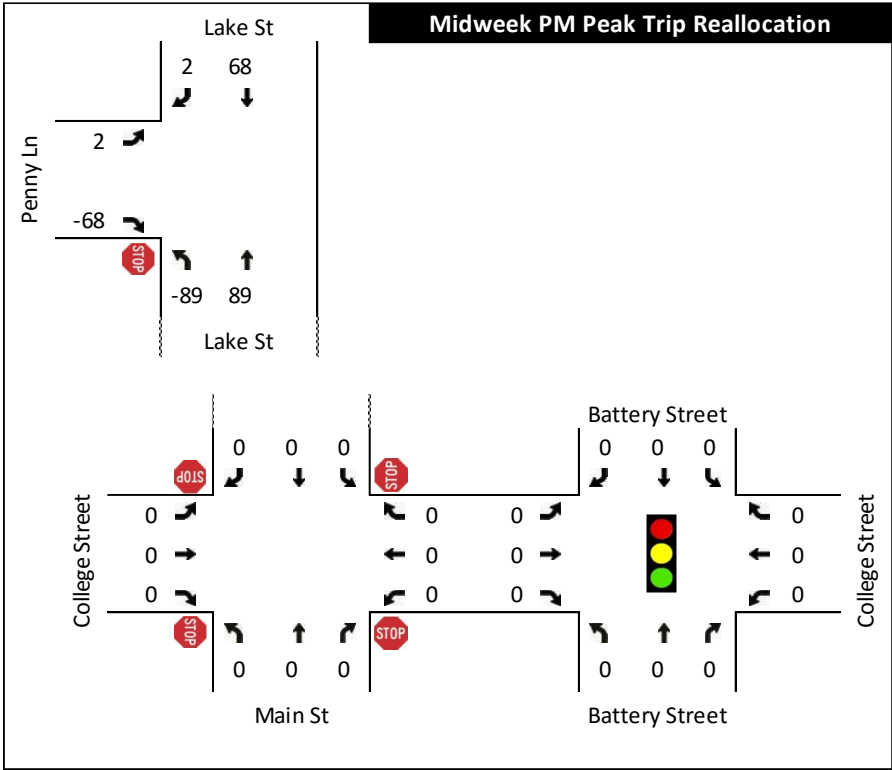
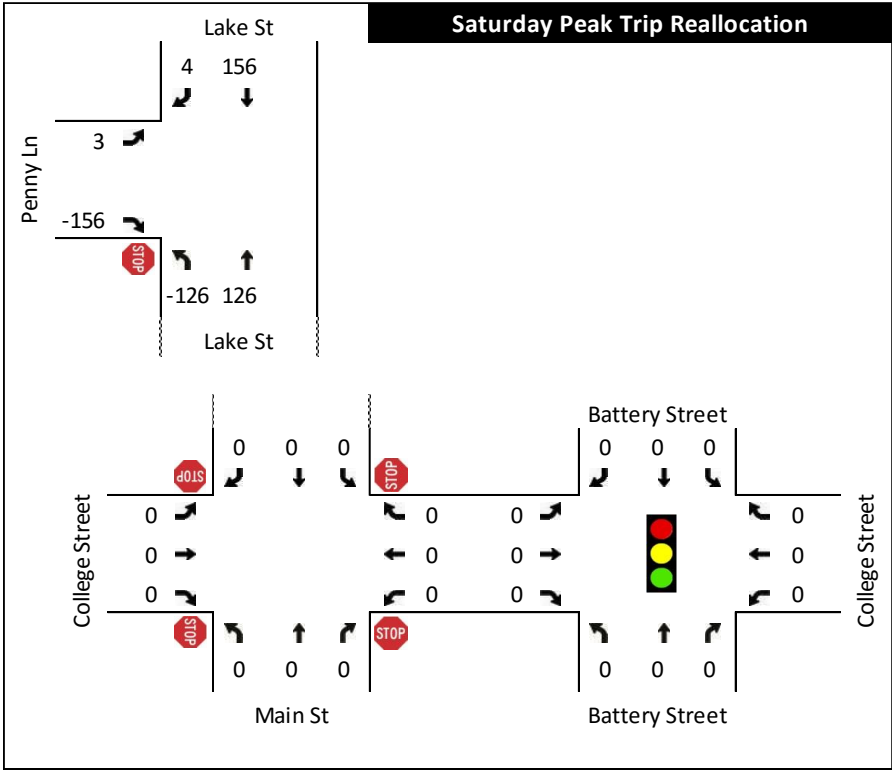


FIGURE 13: RE-DISTRIBUTION OF TRIPS (SATURDAY PEAK HOUR)



4.6 | SCENARIO VOLUME GRAPHICS

Figure 14 through **Figure 21** present the No Build and Build scenario traffic volumes at the three study area intersections. **No Build** traffic volumes include the raw count volumes, adjusted to design hour conditions, and the trip redistribution associated with the Community Sailing Center's relocation and the changed parking situation for visitors of the fishing pier and other waterfront uses. **Build** scenario volumes represent the addition of project-generated traffic to the No Build traffic volumes.

With the addition of site-generated traffic, volumes entering and exiting the project site increase in the Build scenario and these trips are carried out through the neighboring intersections.

FIGURE 14: 2018 PM PEAK HOUR NO BUILD

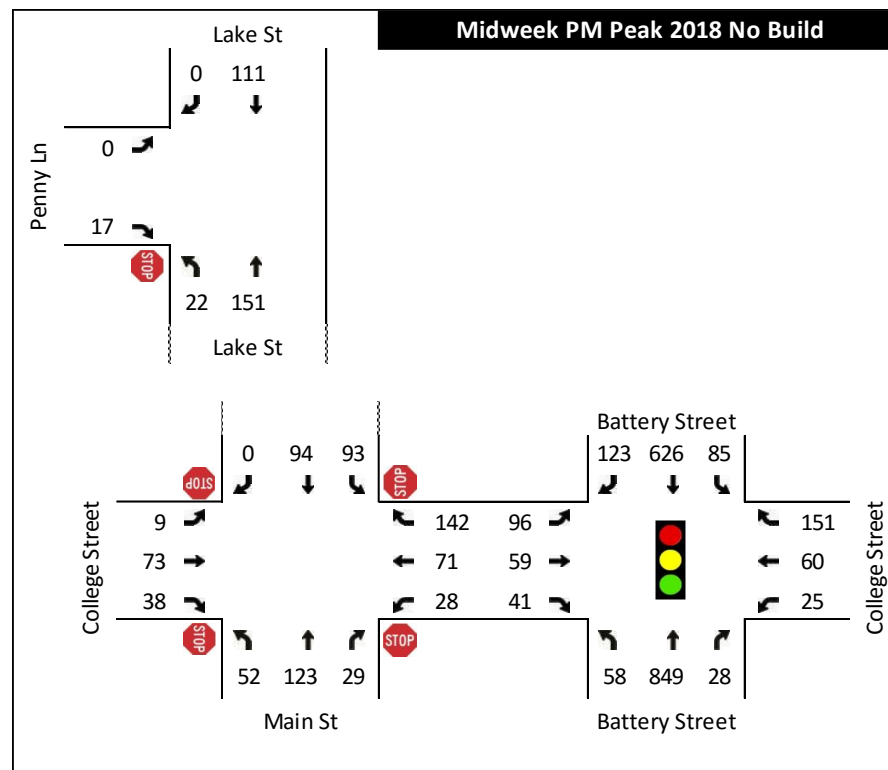


FIGURE 15: 2018 SATURDAY PEAK HOUR NO BUILD

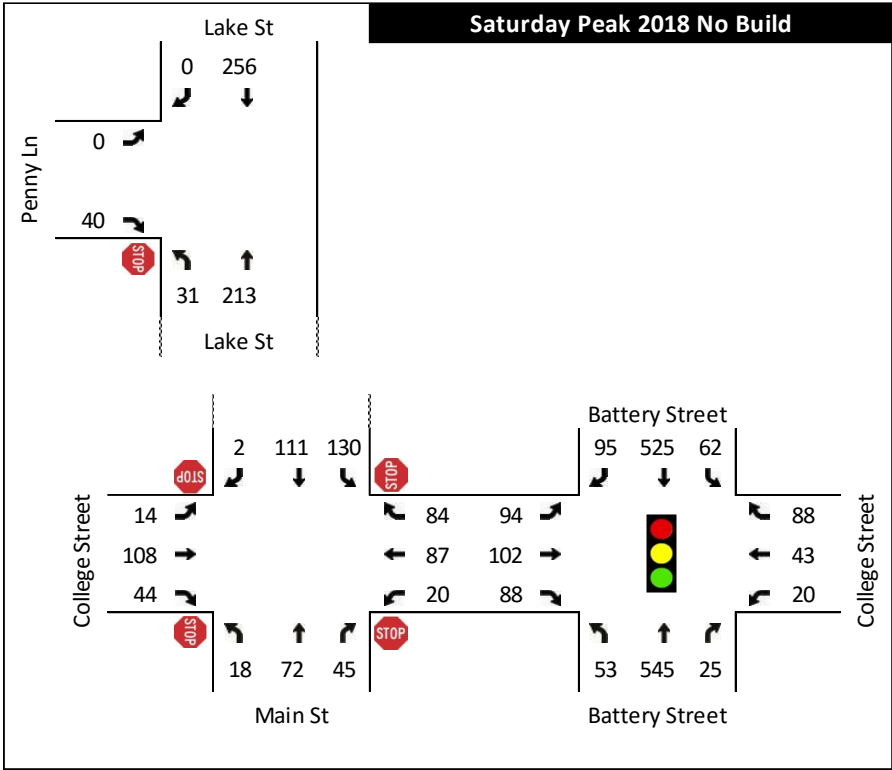


FIGURE 16: 2018 PM PEAK HOUR BUILD

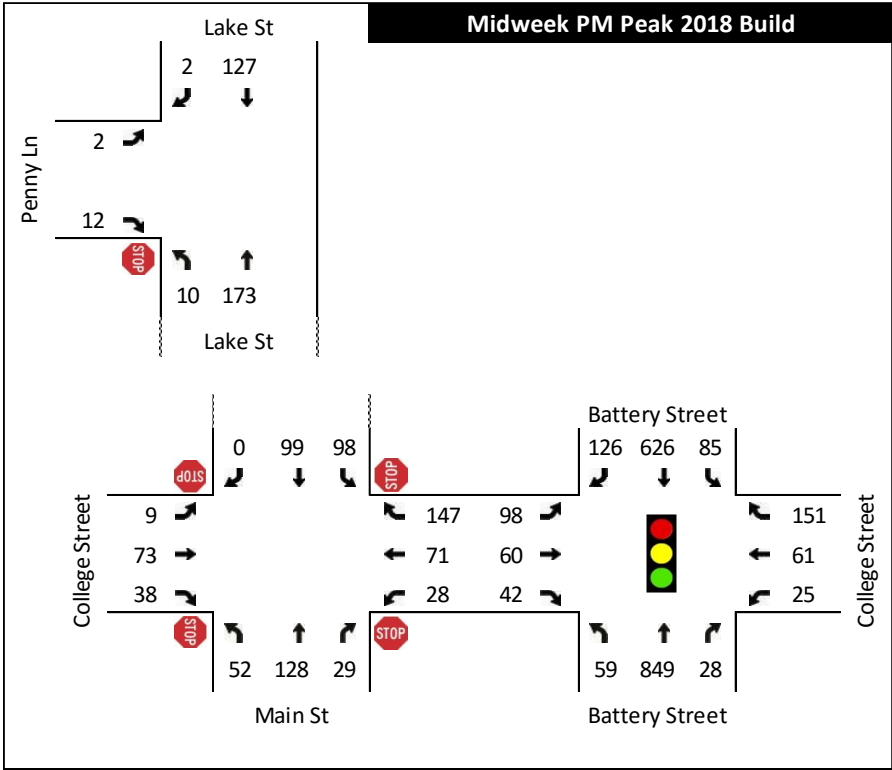


FIGURE 17: 2018 SATURDAY PEAK HOUR BUILD

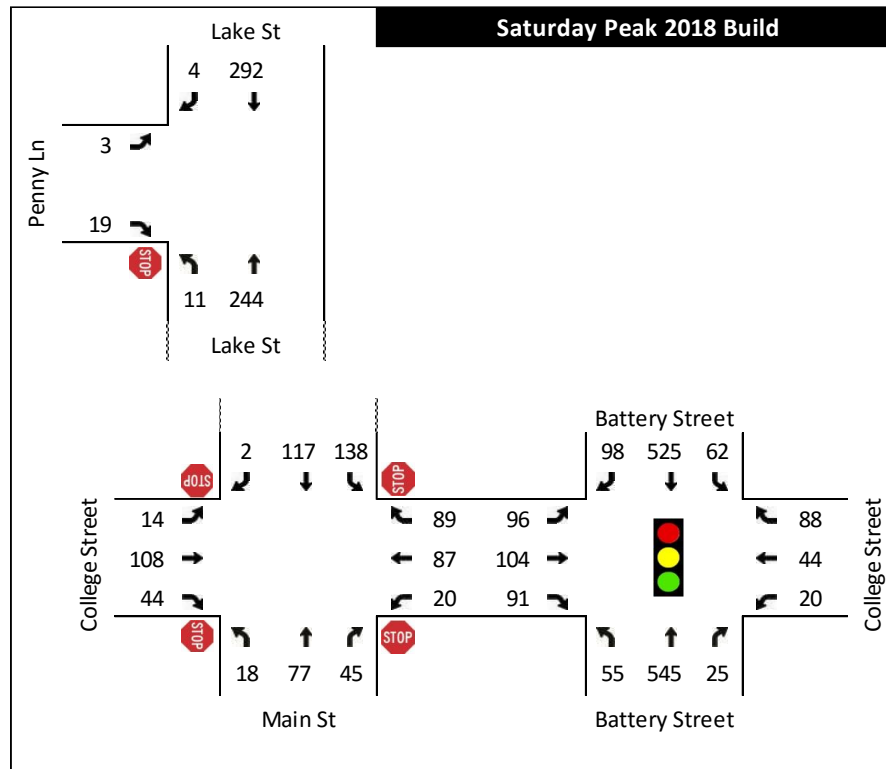


FIGURE 18: 2023 PM PEAK HOUR NO BUILD

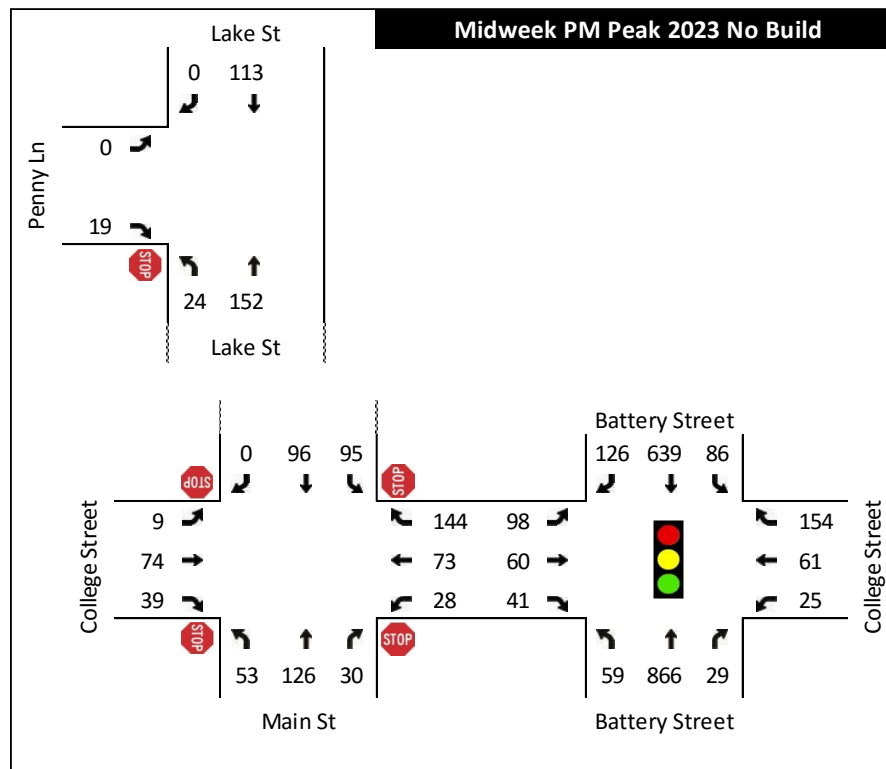


FIGURE 19: 2023 SATURDAY PEAK HOUR NO BUILD

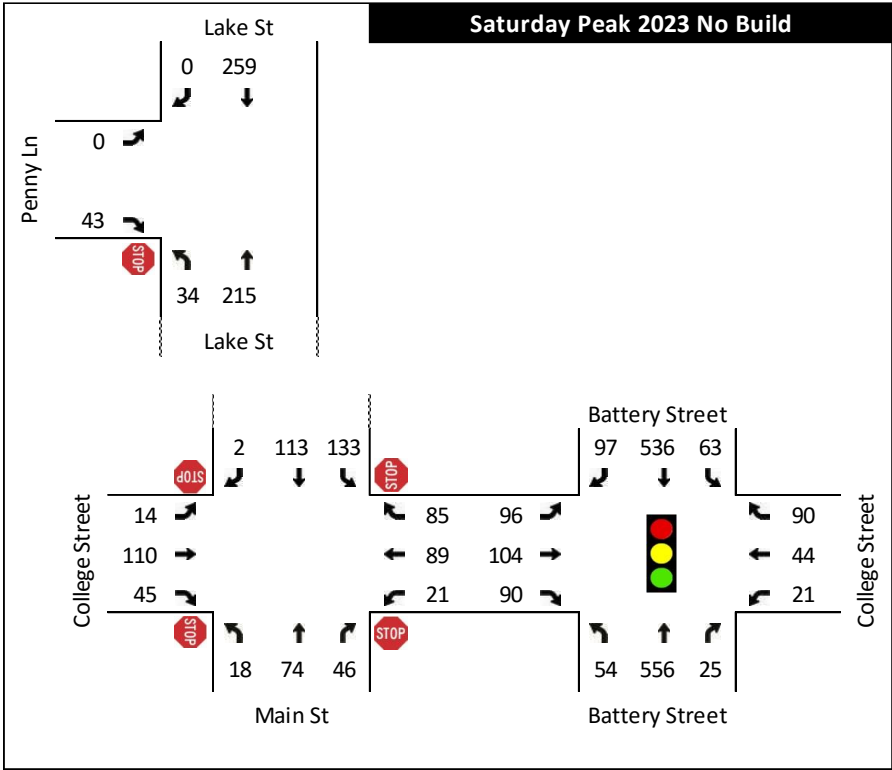


FIGURE 20: 2023 PM PEAK HOUR BUILD

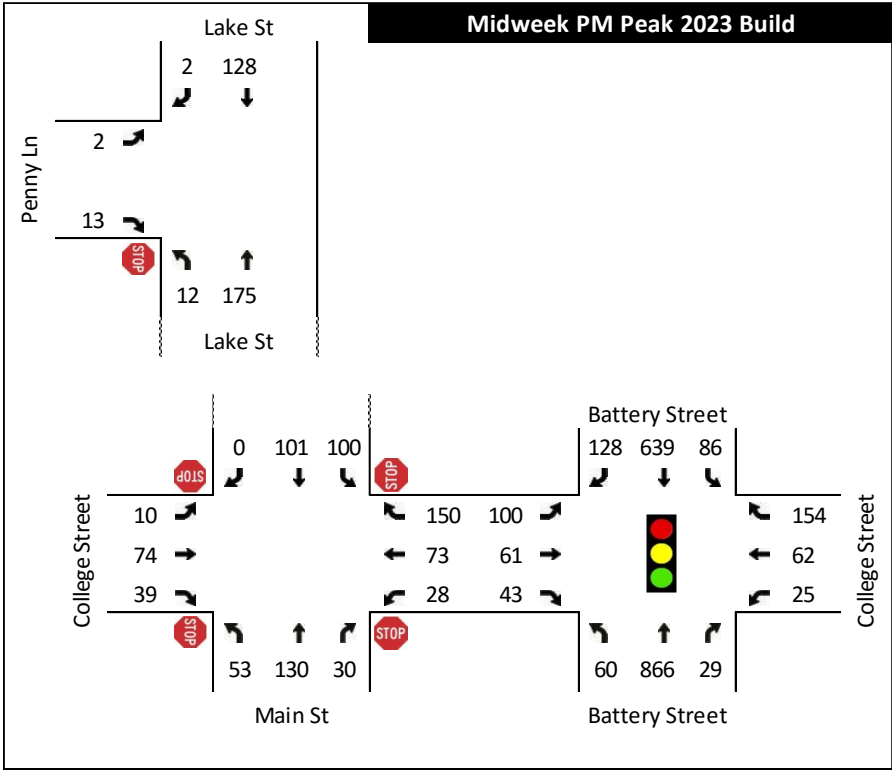
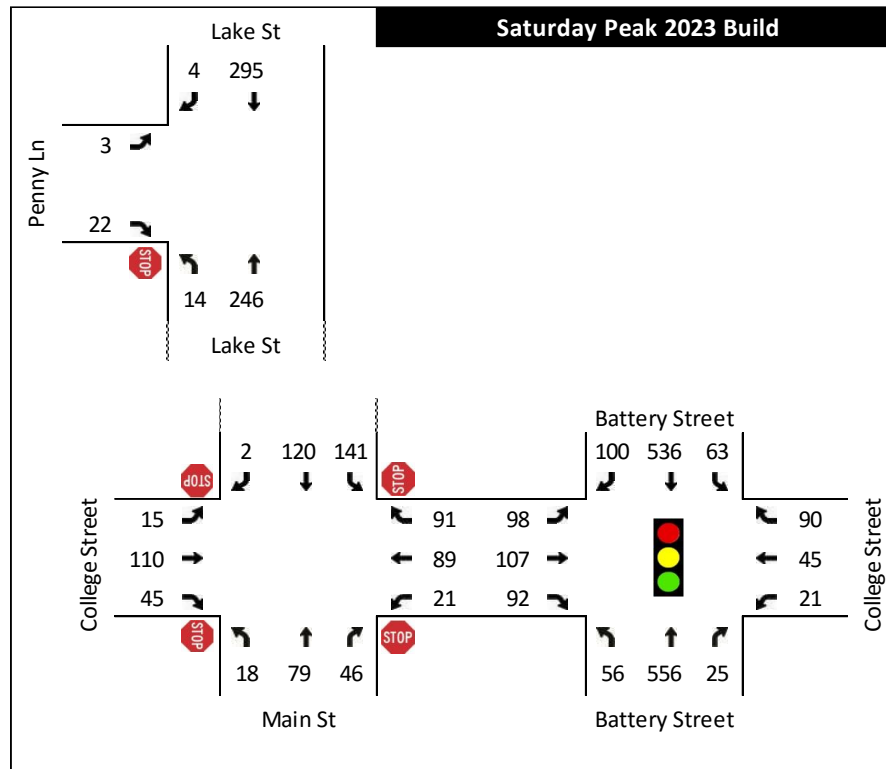


FIGURE 21: 2023 SATURDAY PEAK HOUR BUILD



5.0 CONGESTION ANALYSIS

5.1 | LEVEL-OF-SERVICE DEFINITION

Level-of-service (LOS) is a qualitative measure describing the operating conditions as perceived by motorists driving in a traffic stream. LOS is calculated using the procedures outlined in the 2000 and 2010 Highway Capacity Manuals.⁴ In addition to traffic volumes, key inputs include the number of lanes at each intersection, traffic control type (signalized or unsignalized), and the traffic signal timing plans.

The 2010 Highway Capacity Manual defines six qualitative grades to describe the level of service at an intersection. Level-of-Service is based on the average control delay per vehicle.

Figure 22 shows the various LOS grades and descriptions for signalized and unsignalized intersections.

FIGURE 22: LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

LOS	CHARACTERISTICS	UNSIGNALIZED	SIGNALIZED
		TOTAL DELAY (SEC)	TOTAL DELAY (SEC)
A	Little or no delay	≤ 10.0	≤ 10.0
B	Short delays	10.1-15.0	10.1-20.0
C	Average delays	15.1-25.0	20.1-35.0
D	Long delays	25.1-35.0	35.1-55.0
E	Very long delays	35.1-50.0	55.1-80.0
F	Extreme delays	> 50.0	> 80.0

The delay thresholds for LOS at signalized and unsignalized intersections differ because of the driver's expectations of the operating efficiency for the respective traffic control conditions. According to HCM procedures, an overall LOS cannot be calculated for two-way stop-controlled intersections because not all movements experience delay. In signalized and all-way stop-controlled intersections, all movements experience delay and an overall LOS can be calculated.

The VTrans policy on level of service for **Signalized and All-Way Stop Intersections** is:

- Overall LOS C should be maintained for state-maintained highways and other streets accessing the state's facilities
- Reduced LOS may be acceptable on a case-by-case basis when considering, at minimum, current and future traffic volumes, delays, volume to capacity ratios, crash rates, and negative impacts as a result of improvement necessary to achieve LOS C.

⁴ The HCM 2010 does not provide methodologies for calculating intersection delays at certain intersection types including signalized intersections with exclusive pedestrian phases and signalized intersections with non NEMA-standard phasing. Because of these limitations, HCM 2000 methodologies are employed where necessary.

The VTrans policy on level of service for **Two-Way and One-Way Stop Intersections** is:

- LOS D should be maintained for side roads with volumes exceeding 100 vehicles/hour for a single lane approach (150 vehicles/hour for a two-lane approach) at two-way stop-controlled intersections. No LOS criteria are in effect for volumes less than these.

Detailed Synchro LOS worksheets are available in the Appendix.

5.2 | LEVEL-OF-SERVICE RESULTS

The Highway Capacity Manual congestion reports within Synchro (v8), a traffic analysis software package from Trafficware, routinely relied upon by transportation engineering professionals, were used to assess traffic congestion at the study intersections.

During the both the weekday PM peak hour and Saturday peak hour all intersections are expected to operate at acceptable levels of congestion without or with the proposed Marina.

Figure 23 and **Figure 24** present the LOS results during the weekday AM and PM peak hours, respectively.

FIGURE 23: PM PEAK HOUR LOS RESULTS

Intersections	PM Peak Hour											
	2018 No Build			2018 Build			2023 No Build			2023 Build		
	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c
 College St & Battery St												
Overall	B	19	0.51	B	19	0.51	B	19	0.52	B	19	0.52
EB, along College St	C	29	0.38	C	29	0.39	C	30	0.40	C	30	0.41
WB, along College St	C	26	0.20	C	26	0.20	C	27	0.21	C	27	0.21
NB, along Battery St	B	17	0.60	B	17	0.61	B	16	0.61	B	16	0.61
SB, along Battery St	B	18	0.65	B	18	0.65	B	18	0.65	B	18	0.65
 College St & Lake/Main St												
EB, along College St	A	9	0.17	A	9	0.17	A	9	0.18	A	9	0.18
WB, along College St	A	10	0.32	B	10	0.33	B	10	0.33	B	10	0.34
NB, from Main St	B	10	0.29	B	10	0.30	B	10	0.30	B	10	0.31
SB, from Lake St	B	10	0.27	B	10	0.29	B	10	0.28	B	11	0.30
 Lake St & Penny St												
EB, from Penny Ln	A	9	0.02	A	9	0.02	A	9	0.02	A	9	0.02
NBL, from Lake St	A	7	0.02	A	8	0.01	A	8	0.02	A	8	0.01

FIGURE 24: SATURDAY PEAK HOUR LOS RESULTS

Intersections	Saturday Peak Hour											
	2018 No Build			2018 Build			2023 No Build			2023 Build		
	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c
 College St & Battery St												
Overall	C	22	0.41	C	22	0.42	C	22	0.42	C	22	0.42
EB, along College St	C	20	0.29	C	21	0.29	C	21	0.30	C	21	0.31
WB, along College St	B	18	0.11	B	18	0.11	B	19	0.11	B	19	0.12
NB, along Battery St	C	23	0.55	C	23	0.55	C	22	0.54	C	22	0.55
SB, along Battery St	C	24	0.61	C	24	0.61	C	23	0.61	C	23	0.61
 College St & Lake/Main St												
EB, along College St	A	10	0.23	A	10	0.24	A	10	0.24	A	10	0.25
WB, along College St	A	10	0.26	A	10	0.27	A	10	0.27	A	10	0.28
NB, from Main St	A	9	0.19	A	9	0.20	A	9	0.19	A	9	0.20
SB, from Lake St	B	11	0.35	B	11	0.37	B	11	0.36	B	11	0.38
 Lake St & Penny St												
EB, from Penny Ln	A	10	0.05	B	10	0.03	A	10	0.06	B	10	0.04
NBL, from Lake St	A	8	0.02	A	8	0.01	A	8	0.03	A	8	0.01

6.0 QUEUING ANALYSIS

In addition to the delay congestion analysis, estimated average maximum queues were evaluated using SimTraffic.⁵

Detailed SimTraffic queuing worksheets are available in the Appendix.

FIGURE 25: AVERAGE MAXIMUM QUEUE LENGTHS (VEHICLES)

		PM Peak Hour				Saturday Peak Hour			
		2018		2023		2018		2023	
		No Build	Build	No Build	Build	No Build	Build	No Build	Build
College St & Battery St	EB	4	4	5	4	5	5	5	6
	WB	5	5	5	5	3	3	3	3
	NB	9	9	9	9	7	7	7	7
	SB	8	8	8	8	7	7	7	7
College St & Lake/Main St	EB	2	2	2	2	4	3	4	4
	WB	3	4	3	4	4	4	4	4
	NB	3	4	3	4	3	3	3	3
	SB	3	4	4	4	10	12	12	15
Lake St & Penny St	EB	0	0	1	0	1	1	1	1
	NB	0	0	0	0	0	0	1	0
	SB	0	0	0	0	0	0	0	0

Queues are projected to experience negligible changes associated with the impact of the Marina traffic.

The largest increase in queueing occurs for the southbound approach along Lake Street at the intersection with College Street. Queues are expected to be ten vehicles or greater during the Saturday peak hour without or with the proposed Marina. The predominant source of the queues is the presence of pedestrians, both at the Lake Street - College Street intersection and the number of pedestrians crossing Battery Street reducing the capacity for turning vehicles from College Street.

⁵ Ten hour-long simulations were averaged together to estimate queue lengths. As each run is different, a difference in a few cars should not be seen as significant.

7.0 SUMMARY & CONCLUSIONS

Burlington Harbor Marina, LLC has retained RSG to conduct a traffic impact study to understand and assess the effects of its proposed Burlington Harbor Marina in the Waterfront North area of Burlington, Vermont.

The proposed project would construct a 160 boat slip marina with 96 slips reserved for seasonal rentals and 64 slips for transient users arriving by boat. The Marina will be open May through October.

Key project findings, presented in greater detail below, include:

- Based on the expected vehicle demand for the 96 seasonal berth rentals the Marina is expected to generate 20 trips during the weekday PM peak hour and 26 trips during the Saturday peak hour.
- During the weekday PM peak hour, we project the addition of site generated traffic to the adjacent road network will increase delays on local roadways by less than 1 second or less in both 2018 and 2023.
- Acceptable overall and movement delays for the study intersections are expected with or without the addition of project generated traffic during both the weekday and Saturday peak hours.
- Acceptable queues are expected for all study intersection movements, although an increase of three car lengths is anticipated in 2023 during the Saturday peak hour at the southbound approach to College Street – Lake Street.

We conclude the proposed project will not cause undue adverse traffic congestion or safety conditions and will not unnecessarily or unreasonably endanger the public investment in roads, highways, and related infrastructure.

APPENDICES

APPENDIX A: Raw Counts

APPENDIX B: Crash Reports

APPENDIX C: Synchro Reports

APPENDIX D: SimTraffic Reports



APPENDIX A

RAW COUNTS



Raw Counts

Midweek PM Peak Hour				
Battery St / College St				
	EB	WB	NB	SB
L	85	22	51	75
T	52	53	751	554
R	36	134	25	109
Enter	173	209	827	738
Exit	152	213	970	612
% Trucks	1.7%	1.4%	2.2%	1.1%
Peds	59	19	136	232
Peak Hour	4:45 PM - 5:45 PM Peak			
Lake St / College St				
	EB	WB	NB	SB
L	8	23	46	86
T	67	59	109	83
R	34	117	27	0
Enter	109	199	182	169
Exit	180	105	234	140
% Trucks	0.9%	1.5%	0.5%	0.6%
Peds	8	10	170	324
Peak Hour	4:45 PM - 5:45 PM Peak			
Lake St / Penny Ln (Lake = N/S, Penny=EB)				
	EB	WB	NB	SB
L	0	0	79	0
T	0	0	74	52
R	62	0	0	0
Enter	0	0	153	0
Exit	0	0	0	114

Saturday Peak Hour				
Battery St / College St				
	EB	WB	NB	SB
L	83	18	47	55
T	90	38	482	465
R	78	78	22	84
Enter	251	134	551	604
Exit	167	169	643	561
% Trucks	2.4%	3.7%	3.3%	1.7%
Peds	123	40	253	396
Peak Hour	3:30 PM - 4:30 PM Peak			
Lake St / College St				
	EB	WB	NB	SB
L	12	17	16	106
T	88	73	64	98
R	39	70	37	2
Enter	139	160	117	206
Exit	231	91	146	154
% Trucks	3.6%	0.0%	0.0%	1.0%
Peds	85	63	309	423
Peak Hour	3:30 PM - 4:30 PM Peak			
Lake St / Penny Ln (Lake = N/S, Penny=EB)				
	EB	WB	NB	SB
L	0	0	111	0
T	0	0	105	121
R	141	0	0	0
Enter	0	0	216	0
Exit	0	0	0	262



APPENDIX B

CRASH REPORTS



Reported Crashes in Study Area
7/1/2011 - 7/1/2016

Date	Report Number	Street	Intersection	Intersection With (or Nearest Intersection)	Location	Collision Type	Direction of Collision - Specific	Unusual Circumstances
7/17/2011	2011BU16020	Battery St	Four-Way	College St	Battery St - College St Intersection	Rear End	Rear End	None
8/20/2011	2011BU19081	College St	T-Intersection	1 College St	Along College St	Broadside	Left Turn and Thru, Angle Broadside	Resulted in Injury
9/21/2011	2011BU22124	College St	Four-Way	Battery St	Battery St - College St Intersection	Sideswipe	Same Direction Sideswipe	None
4/23/2012	2012BU009592	College St	Not at a junction	Battery St	Along College St	Unknown	Unknown	None
6/2/2012	2012BU013251	Battery St	Four-Way	College St	Battery St - College St Intersection	Broadside	Left Turn and Thru, Angle Broadside	Wet; Resulted in Injury
6/13/2012	2012BU014332	College St	Not at a junction	Battery St	Along College St	Rear End	Rear End	None
7/5/2012	2012BU016467	Battery St	Four-Way	College St	Battery St - College St Intersection	Other	Rear-to-Rear	None
8/16/2012	2012BU020532	College St	Four-Way	Lake St	Lake St - College St Intersection	Single Vehicle	Single Vehicle Crash	Resulted in Injury
9/21/2012	2012BU024430	College St	Not at a junction	Battery St	Along College St	Sideswipe	Same Direction Sideswipe	None
10/24/2012	2012BU027431	Battery St	Four-Way	College St	Battery St - College St Intersection	Single Vehicle	Single Vehicle Crash	Resulted in Injury
12/29/2012	2012BU032626	Battery St	Four-Way	College St	Battery St - College St Intersection	Rear End	Rear End	Snow
1/28/2013	2013BU002232	College St	Four-Way	Battery St	Battery St - College St Intersection	Broadside	Right Turn and Thru, Broadside	Snow
1/28/2013	2013BU002243	Lake St	Not at a junction	Depot St	Along Lake St	Single Vehicle	Single Vehicle Crash	Snow
2/8/2013	2013BU003008	College St	Four-Way	Battery St	Battery St - College St Intersection	Rear End	Rear End	Snow
5/1/2013	2013BU010016	Lake St	Not at a junction	60 Lake St	Along Lake St	Sideswipe	Same Direction Sideswipe	None
5/3/2013	2013BU010232	College St	Four-Way	Lake St	Lake St - College St Intersection	Sideswipe	Opp Direction Sideswipe	None
5/3/2013	2013BU010232	College St	Four-Way	College St	Lake St - College St Intersection	Sideswipe	Opp Direction Sideswipe	None
5/14/2013	2013BU011445	Lake St	T-Intersection	60 Lake St	Along Lake St	Sideswipe	Same Direction Sideswipe	None
6/27/2013	2013BU015921	College St	Four-Way	Lake St	Lake St - College St Intersection	Rear End	Rear End	None
7/6/2013	2013BU016951	College St	Four-Way	Lake St	Lake St - College St Intersection	Rear End	Rear End	None
7/13/2013	2013BU017633	College St	Not at a junction	Lake St	Along College St	Sideswipe	Same Direction Sideswipe	None
10/7/2013	2013BU027099	College St	Unknown	Battery St	Along College St	Unknown	Unknown	None
10/7/2013	2013BU027100	Battery St	Four-Way	College St	Battery St - College St Intersection	Unknown	Unknown	None
10/10/2013	2013BU027420	College St	Not at a junction	1 College St	Along College St	Sideswipe	Opp Direction Sideswipe	None
11/30/2013	2013BU031878	College St	Unknown	Battery St	Along College St	Unknown	Unknown	None
1/2/2014	2014BU000161	Battery St	Four-Way	College St	Battery St - College St Intersection	Unknown	Unknown	Snow
1/3/2014	2014BU000197	College St	Four-Way	Battery St	Battery St - College St Intersection	Rear End	Rear End	Snow
2/23/2014	2014BU004759	College St	Not at a junction	Battery St	Along College St	Unknown	Unknown	None
5/31/2014	2014BU013912	College St	Not at a junction	Battery St	Along College St	Sideswipe	Same Direction Sideswipe	None
6/11/2014	2014BU015135	Lake St	Not at a junction	College St	Along Lake St	Sideswipe	Same Direction Sideswipe	None
6/19/2014	2014BU015959	Lake St	Four-Way	College St	Lake St - College St Intersection	Sideswipe	Same Direction Sideswipe	Resulted in Injury
7/22/2014	2014BU019514	Battery St	Four-Way	College St	Battery St - College St Intersection	Sideswipe	Same Direction Sideswipe	None
8/8/2014	2014BU021501	College St	Four-Way	Battery St	Battery St - College St Intersection	Broadside	Left Turn and Thru, Angle Broadside	None
8/29/2014	2014BU023987	Lake St	Not at a junction	College St	Along Lake St	Sideswipe	Same Direction Sideswipe	None
9/4/2014	2014BU024646	College St	Four-Way	Battery St	Battery St - College St Intersection	Rear End	Rear End	None
9/8/2014	2014BU025140	Lake St	Not at a junction	College St	Along Lake St	Rear End	Rear End	None
10/2/2014	2014BU027880	Lake St	Not at a junction	College St	Along Lake St	Rear End	Rear End	None
11/1/2014	2014BU031134	Battery St	Four-Way	College St	Battery St - College St Intersection	Rear End	Rear End	Wet
11/19/2014	2014BU032714	Battery St	Four-Way	College St	Battery St - College St Intersection	Broadside	No Turns, Thru moves only, Broadside	Resulted in Injury
1/5/2015	2015BU000342	Battery St	Four-Way	College St	Battery St - College St Intersection	Sideswipe	Same Direction Sideswipe	Resulted in Injury
2/8/2015	2015BU003202	College St	Four-Way	Battery St	Battery St - College St Intersection	Other	Head On	Wet
3/20/2015	2015BU006730	College St	Four-Way	Battery St	Battery St - College St Intersection	Unknown	Unknown	None
4/25/2015	2015BU010286	Battery St	Four-Way	College St	Battery St - College St Intersection	Broadside	No Turns, Thru moves only, Broadside	None
6/6/2015	2015BU014921	College St	Four-Way	Battery St	Battery St - College St Intersection	Broadside	No Turns, Thru moves only, Broadside	Resulted in Injury
7/4/2015	2015BU017817	Battery St	Four-Way	College St	Battery St - College St Intersection	Sideswipe	Opp Direction Sideswipe	Resulted in Injury
9/18/2015	2015BU026605	Lake St	Not at a junction	College St	Along Lake St	Sideswipe	Left Turn and Thru, Same Direction Sideswipe/Angle Crash	None
11/4/2015	2015BU031795	Battery St	Four-Way	College St	Battery St - College St Intersection	Sideswipe	Right Turn and Thru, Same Direction Sideswipe/Angle Crash	None
11/21/2015	2015BU033609	Battery St	Four-Way	College St	Battery St - College St Intersection	Broadside	Right Turn and Thru, Broadside	None
4/15/2016	2016BU009825	Battery St	Four-Way	College St	Battery St - College St Intersection	Rear End	Rear End	None
5/12/2016	2016BU012942	Lake St	Not at a junction	College St	Along Lake St	Sideswipe	Same Direction Sideswipe	None
5/13/2016	2016BU013145	College St	Four-Way	Lake St	Lake St - College St Intersection	Rear End	Rear End	None
6/20/2016	2016BU017715	Battery St	Four-Way	College St	Battery St - College St Intersection	Broadside	Left Turn and Thru, Angle Broadside	None
6/29/2016	2016BU018696	College St	Four-Way	Lake St	Lake St - College St Intersection	Rear End	Rear End	None



APPENDIX C

SYNCHRO REPORTS



HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	59	41	25	60	151	58	849	28	85	626	123
Future Volume (vph)	96	59	41	25	60	151	58	849	28	85	626	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.91			1.00	0.68		1.00			0.98	
Flpb, ped/bikes	0.72	1.00			0.95	1.00		1.00			1.00	
Frt	1.00	0.94			1.00	0.85		1.00			0.98	
Flt Protected	0.95	1.00			0.99	1.00		1.00			0.99	
Satd. Flow (prot)	1283	1596			1757	1095		3498			3390	
Flt Permitted	0.70	1.00			0.91	1.00		0.84			0.71	
Satd. Flow (perm)	948	1596			1619	1095		2947			2416	
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)	96	59	41	25	60	151	58	849	28	85	626	123
RTOR Reduction (vph)	0	26	0	0	0	111	0	3	0	0	18	0
Lane Group Flow (vph)	96	74	0	0	85	40	0	932	0	0	816	0
Confl. Peds. (#/hr)	232		136	136		232	59		19	19		59
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	23.9	23.9			23.9	23.9		47.1			47.1	
Effective Green, g (s)	23.9	23.9			23.9	23.9		47.1			47.1	
Actuated g/C Ratio	0.27	0.27			0.27	0.27		0.52			0.52	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	251	423			429	290		1542			1264	
v/s Ratio Prot		0.05										
v/s Ratio Perm	c0.10				0.05	0.04		0.32			c0.34	
v/c Ratio	0.38	0.18			0.20	0.14		0.60			0.65	
Uniform Delay, d1	27.0	25.5			25.6	25.2		15.0			15.4	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	4.4	0.9			1.0	1.0		1.8			2.6	
Delay (s)	31.4	26.4			26.7	26.2		16.7			18.0	
Level of Service	C	C			C	C		B			B	
Approach Delay (s)		28.8			26.4			16.7			18.0	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Intersection Delay, s/veh 9.9

Intersection LOS A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↕				↕				↕				↕	
Traffic Vol, veh/h	0	9	73	38	0	28	71	142	0	52	123	29	0	93	94	0
Future Vol, veh/h	0	9	73	38	0	28	71	142	0	52	123	29	0	93	94	0
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	1	1	1	2	2	2	2	2	1	1	1	2	1	1	1
Mvmt Flow	0	9	73	38	0	28	71	142	0	52	123	29	0	93	94	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.2	10	10.1	10.1
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	7%	12%	50%
Vol Thru, %	60%	61%	29%	50%
Vol Right, %	14%	32%	59%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	204	120	241	187
LT Vol	52	9	28	93
Through Vol	123	73	71	94
RT Vol	29	38	142	0
Lane Flow Rate	204	120	241	187
Geometry Grp	1	1	1	1
Degree of Util (X)	0.283	0.168	0.317	0.267
Departure Headway (Hd)	4.993	5.029	4.735	5.143
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	710	703	750	690
Service Time	3.089	3.129	2.819	3.242
HCM Lane V/C Ratio	0.287	0.171	0.321	0.271
HCM Control Delay	10.1	9.2	10	10.1
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.2	0.6	1.4	1.1

Intersection

Int Delay, s/veh 1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	17	22	151	111	0
Future Vol, veh/h	0	17	22	151	111	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	17	22	151	111	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	306	111	111	0	-	0
Stage 1	111	-	-	-	-	-
Stage 2	195	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	690	948	1492	-	-	-
Stage 1	919	-	-	-	-	-
Stage 2	843	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	679	948	1492	-	-	-
Mov Cap-2 Maneuver	679	-	-	-	-	-
Stage 1	919	-	-	-	-	-
Stage 2	830	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	0.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1492	-	948	-	-
HCM Lane V/C Ratio	0.015	-	0.018	-	-
HCM Control Delay (s)	7.4	0	8.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	60	42	25	61	151	59	849	28	85	626	126
Future Volume (vph)	98	60	42	25	61	151	59	849	28	85	626	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.91			1.00	0.68		1.00			0.98	
Flpb, ped/bikes	0.73	1.00			0.95	1.00		1.00			1.00	
Frt	1.00	0.94			1.00	0.85		1.00			0.98	
Flt Protected	0.95	1.00			0.99	1.00		1.00			0.99	
Satd. Flow (prot)	1283	1595			1759	1095		3498			3387	
Flt Permitted	0.70	1.00			0.91	1.00		0.84			0.71	
Satd. Flow (perm)	947	1595			1621	1095		2937			2416	
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)	98	60	42	25	61	151	59	849	28	85	626	126
RTOR Reduction (vph)	0	26	0	0	0	111	0	3	0	0	19	0
Lane Group Flow (vph)	98	76	0	0	86	40	0	933	0	0	818	0
Confl. Peds. (#/hr)	232		136	136		232	59		19	19		59
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	23.8	23.8			23.8	23.8		47.2			47.2	
Effective Green, g (s)	23.8	23.8			23.8	23.8		47.2			47.2	
Actuated g/C Ratio	0.26	0.26			0.26	0.26		0.52			0.52	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	250	421			428	289		1540			1267	
v/s Ratio Prot		0.05										
v/s Ratio Perm	c0.10				0.05	0.04		0.32			c0.34	
v/c Ratio	0.39	0.18			0.20	0.14		0.61			0.65	
Uniform Delay, d1	27.2	25.6			25.7	25.3		14.9			15.4	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	4.6	0.9			1.1	1.0		1.8			2.6	
Delay (s)	31.7	26.5			26.8	26.3		16.7			17.9	
Level of Service	C	C			C	C		B			B	
Approach Delay (s)		29.1			26.4			16.7			17.9	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.3			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		78.1%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 2010 AWSC
2: Main St/Lake St & College St

9/14/2016

Intersection

Intersection Delay, s/veh10.2

Intersection LOS B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	9	73	38	0	28	71	147	0	52	128	29	0	98	99	0
Future Vol, veh/h	0	9	73	38	0	28	71	147	0	52	128	29	0	98	99	0
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	1	1	1	2	2	2	2	2	1	1	1	2	1	1	1
Mvmt Flow	0	9	73	38	0	28	71	147	0	52	128	29	0	98	99	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.3	10.3	10.3	10.4
HCM LOS	A	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	7%	11%	50%
Vol Thru, %	61%	61%	29%	50%
Vol Right, %	14%	32%	60%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	209	120	246	197
LT Vol	52	9	28	98
Through Vol	128	73	71	99
RT Vol	29	38	147	0
Lane Flow Rate	209	120	246	197
Geometry Grp	1	1	1	1
Degree of Util (X)	0.298	0.173	0.333	0.288
Departure Headway (Hd)	5.141	5.189	4.875	5.272
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	702	691	740	682
Service Time	3.155	3.219	2.886	3.3
HCM Lane V/C Ratio	0.298	0.174	0.332	0.289
HCM Control Delay	10.3	9.3	10.3	10.4
HCM Lane LOS	B	A	B	B
HCM 95th-tile Q	1.2	0.6	1.5	1.2

Intersection

Int Delay, s/veh 0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	12	10	173	127	2
Future Vol, veh/h	2	12	10	173	127	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	2	12	10	173	127	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	321	128	129	0	-	0
Stage 1	128	-	-	-	-	-
Stage 2	193	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	677	927	1469	-	-	-
Stage 1	903	-	-	-	-	-
Stage 2	845	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	672	927	1469	-	-	-
Mov Cap-2 Maneuver	672	-	-	-	-	-
Stage 1	903	-	-	-	-	-
Stage 2	838	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1469	-	879	-	-
HCM Lane V/C Ratio	0.007	-	0.016	-	-
HCM Control Delay (s)	7.5	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	102	88	20	43	88	53	545	25	62	525	95
Future Volume (vph)	94	102	88	20	43	88	53	545	25	62	525	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.85			1.00	0.64		1.00			0.96	
Flpb, ped/bikes	0.67	1.00			0.93	1.00		0.99			1.00	
Frt	1.00	0.93			1.00	0.85		0.99			0.98	
Flt Protected	0.95	1.00			0.98	1.00		1.00			1.00	
Satd. Flow (prot)	1188	1475			1666	988		3426			3285	
Flt Permitted	0.72	1.00			0.90	1.00		0.82			0.82	
Satd. Flow (perm)	895	1475			1521	988		2835			2703	
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	102	88	20	43	88	53	545	25	62	525	95
RTOR Reduction (vph)	0	26	0	0	0	54	0	5	0	0	21	0
Lane Group Flow (vph)	94	164	0	0	63	34	0	618	0	0	661	0
Confl. Peds. (#/hr)	396		253	253		396	123		40	40		123
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	35.0	35.0			35.0	35.0		36.0			36.0	
Effective Green, g (s)	35.0	35.0			35.0	35.0		36.0			36.0	
Actuated g/C Ratio	0.39	0.39			0.39	0.39		0.40			0.40	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	348	573			591	384		1134			1081	
v/s Ratio Prot		c0.11										
v/s Ratio Perm	0.11				0.04	0.03		0.22			c0.24	
v/c Ratio	0.27	0.29			0.11	0.09		0.55			0.61	
Uniform Delay, d1	18.8	18.9			17.5	17.4		20.7			21.4	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.9	1.3			0.4	0.5		1.9			2.6	
Delay (s)	20.7	20.2			17.9	17.9		22.6			24.0	
Level of Service	C	C			B	B		C			C	
Approach Delay (s)		20.3			17.9			22.6			24.0	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.4				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			70.2%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh 9.9

Intersection LOS A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↕				↕				↕				↕	
Traffic Vol, veh/h	0	14	108	44	0	20	87	84	0	18	72	45	0	130	111	2
Future Vol, veh/h	0	14	108	44	0	20	87	84	0	18	72	45	0	130	111	2
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	4	4	4	2	0	0	0	2	0	0	0	2	1	1	1
Mvmt Flow	0	14	108	44	0	20	87	84	0	18	72	45	0	130	111	2
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.6	9.6	9.1	10.8
HCM LOS	A	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	13%	8%	10%	53%
Vol Thru, %	53%	65%	46%	46%
Vol Right, %	33%	27%	44%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	166	191	243
LT Vol	18	14	20	130
Through Vol	72	108	87	111
RT Vol	45	44	84	2
Lane Flow Rate	135	166	191	243
Geometry Grp	1	1	1	1
Degree of Util (X)	0.184	0.231	0.255	0.341
Departure Headway (Hd)	4.917	5.007	4.812	5.05
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	721	709	737	705
Service Time	3.012	3.097	2.899	3.135
HCM Lane V/C Ratio	0.187	0.234	0.259	0.345
HCM Control Delay	9.1	9.6	9.6	10.8
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.7	0.9	1	1.5

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	40	31	213	256	0
Future Vol, veh/h	0	40	31	213	256	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	40	31	213	256	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	531	256	256	0	-	0
Stage 1	256	-	-	-	-	-
Stage 2	275	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	512	788	1321	-	-	-
Stage 1	791	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	498	788	1321	-	-	-
Mov Cap-2 Maneuver	498	-	-	-	-	-
Stage 1	791	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.8	1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1321	-	788	-	-	
HCM Lane V/C Ratio	0.023	-	0.051	-	-	
HCM Control Delay (s)	7.8	0	9.8	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-	

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	104	91	20	44	88	55	545	25	62	525	98
Future Volume (vph)	96	104	91	20	44	88	55	545	25	62	525	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.85			1.00	0.64		1.00			0.95	
Flpb, ped/bikes	0.67	1.00			0.93	1.00		0.99			1.00	
Frt	1.00	0.93			1.00	0.85		0.99			0.98	
Flt Protected	0.95	1.00			0.98	1.00		1.00			1.00	
Satd. Flow (prot)	1189	1472			1670	988		3425			3279	
Flt Permitted	0.72	1.00			0.90	1.00		0.82			0.82	
Satd. Flow (perm)	895	1472			1525	988		2804			2698	
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)	96	104	91	20	44	88	55	545	25	62	525	98
RTOR Reduction (vph)	0	27	0	0	0	54	0	5	0	0	22	0
Lane Group Flow (vph)	96	168	0	0	64	34	0	620	0	0	663	0
Confl. Peds. (#/hr)	396		253	253		396	123		40	40		123
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	34.9	34.9			34.9	34.9		36.1			36.1	
Effective Green, g (s)	34.9	34.9			34.9	34.9		36.1			36.1	
Actuated g/C Ratio	0.39	0.39			0.39	0.39		0.40			0.40	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	347	570			591	383		1124			1082	
v/s Ratio Prot		c0.11										
v/s Ratio Perm	0.11				0.04	0.03		0.22			c0.25	
v/c Ratio	0.28	0.29			0.11	0.09		0.55			0.61	
Uniform Delay, d1	18.9	19.0			17.6	17.5		20.7			21.4	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.0	1.3			0.4	0.5		2.0			2.6	
Delay (s)	20.9	20.4			18.0	17.9		22.7			24.0	
Level of Service	C	C			B	B		C			C	
Approach Delay (s)		20.5			17.9			22.7			24.0	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.4				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			70.4%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh10.1

Intersection LOS B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔				↔				↔	
Traffic Vol, veh/h	0	14	108	44	0	20	87	89	0	18	77	45	0	138	117	2
Future Vol, veh/h	0	14	108	44	0	20	87	89	0	18	77	45	0	138	117	2
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	4	4	4	2	0	0	0	2	0	0	0	2	1	1	1
Mvmt Flow	0	14	108	44	0	20	87	89	0	18	77	45	0	138	117	2
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.8	9.7	9.3	11.1
HCM LOS	A	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	13%	8%	10%	54%
Vol Thru, %	55%	65%	44%	46%
Vol Right, %	32%	27%	45%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	166	196	257
LT Vol	18	14	20	138
Through Vol	77	108	87	117
RT Vol	45	44	89	2
Lane Flow Rate	140	166	196	257
Geometry Grp	1	1	1	1
Degree of Util (X)	0.197	0.239	0.265	0.362
Departure Headway (Hd)	5.068	5.175	4.965	5.184
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	711	699	727	699
Service Time	3.078	3.175	2.965	3.184
HCM Lane V/C Ratio	0.197	0.237	0.27	0.368
HCM Control Delay	9.3	9.8	9.7	11.1
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.7	0.9	1.1	1.7

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	19	11	244	292	4
Future Vol, veh/h	3	19	11	244	292	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	3	19	11	244	292	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	560	294	296	0	-	0
Stage 1	294	-	-	-	-	-
Stage 2	266	-	-	-	-	-
Critical Hdwy	7.1	6.2	4.1	-	-	-
Critical Hdwy Stg 1	6.1	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	442	750	1277	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	744	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	439	750	1277	-	-	-
Mov Cap-2 Maneuver	439	-	-	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	737	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1277	-	684	-	-
HCM Lane V/C Ratio	0.009	-	0.032	-	-
HCM Control Delay (s)	7.8	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	60	41	25	61	154	59	866	29	86	639	126
Future Volume (vph)	98	60	41	25	61	154	59	866	29	86	639	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.91			1.00	0.68		1.00			0.98	
Flpb, ped/bikes	0.73	1.00			0.95	1.00		1.00			1.00	
Frt	1.00	0.94			1.00	0.85		1.00			0.98	
Flt Protected	0.95	1.00			0.99	1.00		1.00			0.99	
Satd. Flow (prot)	1283	1599			1759	1095		3498			3390	
Flt Permitted	0.70	1.00			0.91	1.00		0.84			0.71	
Satd. Flow (perm)	947	1599			1620	1095		2936			2404	
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)	98	60	41	25	61	154	59	866	29	86	639	126
RTOR Reduction (vph)	0	25	0	0	0	114	0	3	0	0	18	0
Lane Group Flow (vph)	98	76	0	0	86	40	0	951	0	0	833	0
Confl. Peds. (#/hr)	232		136	136		232	59		19	19		59
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	23.2	23.2			23.2	23.2		47.8			47.8	
Effective Green, g (s)	23.2	23.2			23.2	23.2		47.8			47.8	
Actuated g/C Ratio	0.26	0.26			0.26	0.26		0.53			0.53	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	244	412			417	282		1559			1276	
v/s Ratio Prot		0.05										
v/s Ratio Perm	c0.10				0.05	0.04		0.32			c0.35	
v/c Ratio	0.40	0.18			0.21	0.14		0.61			0.65	
Uniform Delay, d1	27.7	26.0			26.2	25.7		14.6			15.1	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	4.9	1.0			1.1	1.0		1.8			2.6	
Delay (s)	32.5	27.0			27.3	26.8		16.4			17.8	
Level of Service	C	C			C	C		B			B	
Approach Delay (s)		29.7			27.0			16.4			17.8	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			19.2				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)		12.0			
Intersection Capacity Utilization			79.0%				ICU Level of Service		D			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh10.1

Intersection LOS B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	9	74	39	0	28	73	144	0	53	126	30	0	95	96	0
Future Vol, veh/h	0	9	74	39	0	28	73	144	0	53	126	30	0	95	96	0
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	1	1	1	2	2	2	2	2	1	1	1	2	1	1	1
Mvmt Flow	0	9	74	39	0	28	73	144	0	53	126	30	0	95	96	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.3	10.3	10.3	10.3
HCM LOS	A	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	7%	11%	50%
Vol Thru, %	60%	61%	30%	50%
Vol Right, %	14%	32%	59%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	209	122	245	191
LT Vol	53	9	28	95
Through Vol	126	74	73	96
RT Vol	30	39	144	0
Lane Flow Rate	209	122	245	191
Geometry Grp	1	1	1	1
Degree of Util (X)	0.298	0.175	0.331	0.28
Departure Headway (Hd)	5.13	5.165	4.867	5.272
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	702	694	742	682
Service Time	3.144	3.199	2.88	3.3
HCM Lane V/C Ratio	0.298	0.176	0.33	0.28
HCM Control Delay	10.3	9.3	10.3	10.3
HCM Lane LOS	B	A	B	B
HCM 95th-tile Q	1.2	0.6	1.5	1.1

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	19	24	152	113	0
Future Vol, veh/h	0	19	24	152	113	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	19	24	152	113	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	313	113	113	0	-	0
Stage 1	113	-	-	-	-	-
Stage 2	200	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	684	945	1489	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	838	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	672	945	1489	-	-	-
Mov Cap-2 Maneuver	672	-	-	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	823	-	-	-	-	-

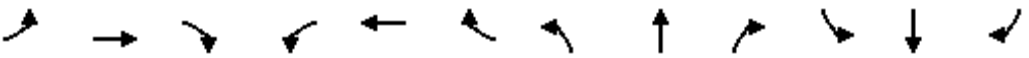
Approach	EB	NB	SB
HCM Control Delay, s	8.9	1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1489	-	945	-	-
HCM Lane V/C Ratio	0.016	-	0.02	-	-
HCM Control Delay (s)	7.5	0	8.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	61	43	25	62	154	60	866	29	86	639	128
Future Volume (vph)	100	61	43	25	62	154	60	866	29	86	639	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.91			1.00	0.68		1.00			0.98	
Flpb, ped/bikes	0.73	1.00			0.95	1.00		1.00			1.00	
Frt	1.00	0.94			1.00	0.85		1.00			0.98	
Flt Protected	0.95	1.00			0.99	1.00		1.00			0.99	
Satd. Flow (prot)	1284	1594			1760	1095		3498			3387	
Flt Permitted	0.70	1.00			0.91	1.00		0.83			0.71	
Satd. Flow (perm)	947	1594			1621	1095		2927			2404	
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)	100	61	43	25	62	154	60	866	29	86	639	128
RTOR Reduction (vph)	0	26	0	0	0	114	0	3	0	0	18	0
Lane Group Flow (vph)	100	78	0	0	87	40	0	952	0	0	835	0
Confl. Peds. (#/hr)	232		136	136		232	59		19	19		59
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	23.1	23.1			23.1	23.1		47.9			47.9	
Effective Green, g (s)	23.1	23.1			23.1	23.1		47.9			47.9	
Actuated g/C Ratio	0.26	0.26			0.26	0.26		0.53			0.53	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	243	409			416	281		1557			1279	
v/s Ratio Prot		0.05										
v/s Ratio Perm	c0.11				0.05	0.04		0.33			c0.35	
v/c Ratio	0.41	0.19			0.21	0.14		0.61			0.65	
Uniform Delay, d1	27.8	26.1			26.3	25.8		14.6			15.1	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	5.1	1.0			1.1	1.0		1.8			2.6	
Delay (s)	32.9	27.2			27.4	26.8		16.4			17.7	
Level of Service	C	C			C	C		B			B	
Approach Delay (s)		30.0			27.0			16.4			17.7	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			19.3				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			79.1%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh10.4

Intersection LOS B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↕				↕				↕				↕	
Traffic Vol, veh/h	0	10	74	39	0	28	73	150	0	53	130	30	0	100	101	0
Future Vol, veh/h	0	10	74	39	0	28	73	150	0	53	130	30	0	100	101	0
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	1	1	1	2	2	2	2	2	1	1	1	2	1	1	1
Mvmt Flow	0	10	74	39	0	28	73	150	0	53	130	30	0	100	101	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.4	10.5	10.5	10.6
HCM LOS	A	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	8%	11%	50%
Vol Thru, %	61%	60%	29%	50%
Vol Right, %	14%	32%	60%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	213	123	251	201
LT Vol	53	10	28	100
Through Vol	130	74	73	101
RT Vol	30	39	150	0
Lane Flow Rate	213	123	251	201
Geometry Grp	1	1	1	1
Degree of Util (X)	0.305	0.179	0.343	0.296
Departure Headway (Hd)	5.163	5.228	4.921	5.309
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	697	686	735	677
Service Time	3.194	3.262	2.921	3.34
HCM Lane V/C Ratio	0.306	0.179	0.341	0.297
HCM Control Delay	10.5	9.4	10.5	10.6
HCM Lane LOS	B	A	B	B
HCM 95th-tile Q	1.3	0.6	1.5	1.2

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	13	12	175	128	2
Future Vol, veh/h	2	13	12	175	128	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	2	13	12	175	128	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	328	129	130	0	-	0
Stage 1	129	-	-	-	-	-
Stage 2	199	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	671	926	1468	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	665	926	1468	-	-	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	831	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1468	-	880	-	-
HCM Lane V/C Ratio	0.008	-	0.017	-	-
HCM Control Delay (s)	7.5	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	104	90	21	44	90	54	556	25	63	536	97
Future Volume (vph)	96	104	90	21	44	90	54	556	25	63	536	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.85			1.00	0.64		1.00			0.96	
Flpb, ped/bikes	0.67	1.00			0.93	1.00		0.99			1.00	
Frt	1.00	0.93			1.00	0.85		0.99			0.98	
Flt Protected	0.95	1.00			0.98	1.00		1.00			1.00	
Satd. Flow (prot)	1189	1475			1665	988		3427			3285	
Flt Permitted	0.71	1.00			0.89	1.00		0.82			0.82	
Satd. Flow (perm)	895	1475			1512	988		2829			2699	
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)	96	104	90	21	44	90	54	556	25	63	536	97
RTOR Reduction (vph)	0	27	0	0	0	56	0	5	0	0	21	0
Lane Group Flow (vph)	96	167	0	0	65	34	0	630	0	0	675	0
Confl. Peds. (#/hr)	396		253	253		396	123		40	40		123
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	34.1	34.1			34.1	34.1		36.9			36.9	
Effective Green, g (s)	34.1	34.1			34.1	34.1		36.9			36.9	
Actuated g/C Ratio	0.38	0.38			0.38	0.38		0.41			0.41	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	339	558			572	374		1159			1106	
v/s Ratio Prot		c0.11										
v/s Ratio Perm	0.11				0.04	0.03		0.22			c0.25	
v/c Ratio	0.28	0.30			0.11	0.09		0.54			0.61	
Uniform Delay, d1	19.4	19.6			18.1	18.0		20.2			20.9	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.1	1.4			0.4	0.5		1.8			2.5	
Delay (s)	21.5	21.0			18.5	18.5		22.0			23.4	
Level of Service	C	C			B	B		C			C	
Approach Delay (s)		21.1			18.5			22.0			23.4	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.1				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			71.9%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh10.1

Intersection LOS B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↕				↕				↕				↕	
Traffic Vol, veh/h	0	14	110	45	0	21	89	85	0	18	74	46	0	133	113	2
Future Vol, veh/h	0	14	110	45	0	21	89	85	0	18	74	46	0	133	113	2
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	4	4	4	2	0	0	0	2	0	0	0	2	1	1	1
Mvmt Flow	0	14	110	45	0	21	89	85	0	18	74	46	0	133	113	2
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.8	9.8	9.3	11
HCM LOS	A	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	13%	8%	11%	54%
Vol Thru, %	54%	65%	46%	46%
Vol Right, %	33%	27%	44%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	169	195	248
LT Vol	18	14	21	133
Through Vol	74	110	89	113
RT Vol	46	45	85	2
Lane Flow Rate	138	169	195	248
Geometry Grp	1	1	1	1
Degree of Util (X)	0.194	0.241	0.268	0.35
Departure Headway (Hd)	5.048	5.141	4.945	5.19
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	712	701	729	697
Service Time	3.068	3.147	2.95	3.19
HCM Lane V/C Ratio	0.194	0.241	0.267	0.356
HCM Control Delay	9.3	9.8	9.8	11
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.7	0.9	1.1	1.6

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	43	34	215	259	0
Future Vol, veh/h	0	43	34	215	259	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	43	34	215	259	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	542	259	259	0	-	0
Stage 1	259	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	505	785	1317	-	-	-
Stage 1	789	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	490	785	1317	-	-	-
Mov Cap-2 Maneuver	490	-	-	-	-	-
Stage 1	789	-	-	-	-	-
Stage 2	748	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.9	1.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1317	-	785	-	-
HCM Lane V/C Ratio	0.026	-	0.055	-	-
HCM Control Delay (s)	7.8	0	9.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM Signalized Intersection Capacity Analysis

1: Battery St & College St

9/14/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	106	92	21	45	90	56	556	25	63	536	100
Future Volume (vph)	98	106	92	21	45	90	56	556	25	63	536	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes	1.00	0.85			1.00	0.64		1.00			0.95	
Flpb, ped/bikes	0.67	1.00			0.93	1.00		0.99			1.00	
Frt	1.00	0.93			1.00	0.85		0.99			0.98	
Flt Protected	0.95	1.00			0.98	1.00		1.00			1.00	
Satd. Flow (prot)	1190	1474			1668	988		3426			3279	
Flt Permitted	0.71	1.00			0.89	1.00		0.81			0.82	
Satd. Flow (perm)	895	1474			1516	988		2798			2694	
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)	98	106	92	21	45	90	56	556	25	63	536	100
RTOR Reduction (vph)	0	27	0	0	0	56	0	5	0	0	21	0
Lane Group Flow (vph)	98	171	0	0	66	34	0	632	0	0	678	0
Confl. Peds. (#/hr)	396		253	253		396	123		40	40		123
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Actuated Green, G (s)	34.0	34.0			34.0	34.0		37.0			37.0	
Effective Green, g (s)	34.0	34.0			34.0	34.0		37.0			37.0	
Actuated g/C Ratio	0.38	0.38			0.38	0.38		0.41			0.41	
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	338	556			572	373		1150			1107	
v/s Ratio Prot		c0.12										
v/s Ratio Perm	0.11				0.04	0.03		0.23			c0.25	
v/c Ratio	0.29	0.31			0.12	0.09		0.55			0.61	
Uniform Delay, d1	19.6	19.7			18.2	18.0		20.2			20.9	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.2	1.4			0.4	0.5		1.9			2.5	
Delay (s)	21.7	21.2			18.6	18.5		22.1			23.4	
Level of Service	C	C			B	B		C			C	
Approach Delay (s)		21.3			18.6			22.1			23.4	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.2				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			72.1%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh10.3

Intersection LOS B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↕				↕				↕				↕	
Traffic Vol, veh/h	0	15	110	45	0	21	89	91	0	18	79	46	0	140	120	2
Future Vol, veh/h	0	15	110	45	0	21	89	91	0	18	79	46	0	140	120	2
Peak Hour Factor	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.92	1.00	1.00	1.00
Heavy Vehicles, %	2	4	4	4	2	0	0	0	2	0	0	0	2	1	1	1
Mvmt Flow	0	15	110	45	0	21	89	91	0	18	79	46	0	140	120	2
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.9	10	9.4	11.4
HCM LOS	A	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	13%	9%	10%	53%
Vol Thru, %	55%	65%	44%	46%
Vol Right, %	32%	26%	45%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	143	170	201	262
LT Vol	18	15	21	140
Through Vol	79	110	89	120
RT Vol	46	45	91	2
Lane Flow Rate	143	170	201	262
Geometry Grp	1	1	1	1
Degree of Util (X)	0.203	0.246	0.279	0.38
Departure Headway (Hd)	5.109	5.207	5.005	5.22
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	702	690	720	692
Service Time	3.14	3.239	3.021	3.231
HCM Lane V/C Ratio	0.204	0.246	0.279	0.379
HCM Control Delay	9.4	9.9	10	11.4
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.8	1	1.1	1.8

Intersection

Int Delay, s/veh 0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	22	14	246	295	4
Future Vol, veh/h	3	22	14	246	295	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	3	22	14	246	295	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	571	297	299	0	-	0
Stage 1	297	-	-	-	-	-
Stage 2	274	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	486	747	1274	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	777	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	480	747	1274	-	-	-
Mov Cap-2 Maneuver	480	-	-	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	767	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1274	-	700	-	-
HCM Lane V/C Ratio	0.011	-	0.036	-	-
HCM Control Delay (s)	7.9	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-



APPENDIX D

SIMTRAFFIC REPORTS



Queuing and Blocking Report

No Build

8/11/2016

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	172	95	227	52	316	293	282	263
Average Queue (ft)	76	62	98	44	187	162	166	137
95th Queue (ft)	150	109	190	51	282	265	256	236
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	1							
Queuing Penalty (veh)	2							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	13	10	43	32				
Queuing Penalty (veh)	13	9	65	27				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	85	155	156	179
Average Queue (ft)	35	67	68	68
95th Queue (ft)	67	126	125	143
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		1		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	27	35	2
Average Queue (ft)	9	3	0
95th Queue (ft)	27	20	2
Link Distance (ft)	547	125	446
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 118

Queuing and Blocking Report

Build

8/11/2016

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	172	95	221	52	320	280	285	273
Average Queue (ft)	84	62	102	44	188	161	166	138
95th Queue (ft)	157	109	188	52	279	258	251	236
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	2							
Queuing Penalty (veh)	4							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	17	8	43	32				
Queuing Penalty (veh)	18	8	64	28				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	87	171	164	165
Average Queue (ft)	35	77	75	72
95th Queue (ft)	67	141	132	135
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		2		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	27	39
Average Queue (ft)	7	3
95th Queue (ft)	25	18
Link Distance (ft)	547	125
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 124

Queuing and Blocking Report

No Build

8/11/2016

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	181	95	157	56	259	228	231	216
Average Queue (ft)	109	84	58	39	149	114	135	100
95th Queue (ft)	194	112	123	59	229	204	211	191
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	4							
Queuing Penalty (veh)	12							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	13	26	29	15				
Queuing Penalty (veh)	24	24	26	9				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	185	166	131	416
Average Queue (ft)	72	73	62	192
95th Queue (ft)	154	136	109	377
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)	0	1		
Queuing Penalty (veh)	0	2		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	41	61
Average Queue (ft)	17	9
95th Queue (ft)	36	37
Link Distance (ft)	547	125
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 97

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	179	95	166	64	260	235	224	217
Average Queue (ft)	107	81	61	39	149	111	134	108
95th Queue (ft)	195	113	127	62	224	204	208	193
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	5							
Queuing Penalty (veh)	13							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	12	28	30	14				
Queuing Penalty (veh)	23	27	27	9				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	161	162	132	504
Average Queue (ft)	69	73	63	247
95th Queue (ft)	134	132	113	543
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		1		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	36	35
Average Queue (ft)	13	3
95th Queue (ft)	32	20
Link Distance (ft)	547	125
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 100

Queuing and Blocking Report

No Build

8/11/2016

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	178	95	214	58	318	275	300	267
Average Queue (ft)	92	67	96	45	187	158	163	136
95th Queue (ft)	172	115	179	52	278	255	256	232
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	3							
Queuing Penalty (veh)	6							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	22	9	41	31				
Queuing Penalty (veh)	22	9	64	27				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	77	151	157	168
Average Queue (ft)	36	65	69	72
95th Queue (ft)	65	114	121	133
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		1		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	27	40
Average Queue (ft)	12	4
95th Queue (ft)	31	23
Link Distance (ft)	547	125
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 128

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	177	95	247	59	352	296	262	235
Average Queue (ft)	87	65	107	44	185	158	163	136
95th Queue (ft)	165	110	204	54	286	258	243	224
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	2							
Queuing Penalty (veh)	4							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	18	9	44	33				
Queuing Penalty (veh)	19	9	68	29				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	80	153	164	181
Average Queue (ft)	35	71	72	75
95th Queue (ft)	63	124	128	141
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	24	43
Average Queue (ft)	8	2
95th Queue (ft)	26	17
Link Distance (ft)	547	125
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 130

Queuing and Blocking Report

No Build

8/11/2016

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	181	95	160	64	248	217	255	229
Average Queue (ft)	107	83	61	39	145	111	141	111
95th Queue (ft)	192	111	126	61	225	203	224	201
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	5							
Queuing Penalty (veh)	13							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	13	27	32	14				
Queuing Penalty (veh)	25	26	28	9				

Intersection: 2: Main St/Lake St & College St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	194	162	142	501
Average Queue (ft)	76	73	64	244
95th Queue (ft)	149	133	114	524
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		1		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	45	58	2
Average Queue (ft)	18	10	0
95th Queue (ft)	38	40	2
Link Distance (ft)	547	125	446
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 103

Intersection: 1: Battery St & College St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	180	95	153	64	272	236	236	224
Average Queue (ft)	110	83	65	39	146	108	136	109
95th Queue (ft)	195	111	128	61	227	202	216	199
Link Distance (ft)	165		1214		988	988	1012	1012
Upstream Blk Time (%)	4							
Queuing Penalty (veh)	13							
Storage Bay Dist (ft)		70		20				
Storage Blk Time (%)	11	30	33	15				
Queuing Penalty (veh)	22	29	30	10				

Intersection: 2: Main St/Lake St & College St

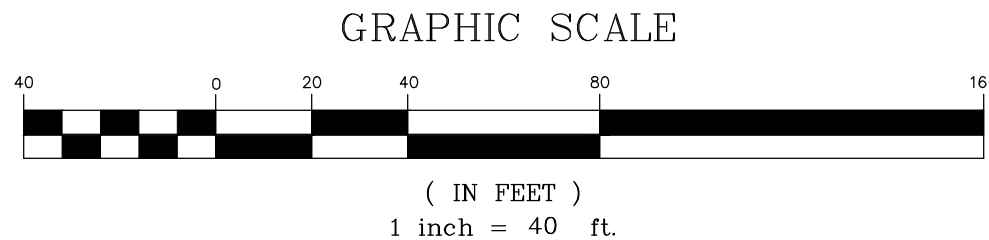
Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	176	160	158	551
Average Queue (ft)	76	77	66	300
95th Queue (ft)	150	142	127	640
Link Distance (ft)	314	165	434	1540
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		2		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Lake St & Penny Ln

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	33	48
Average Queue (ft)	13	4
95th Queue (ft)	33	24
Link Distance (ft)	547	125
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 106



_____	—	_____	SUBJECT PROPERTY LINE
_____	—	_____	OTHER PROPERTY LINE
_____	—	_____	FORMER PROPERTY LINE (NOT ALL SHOWN)
	IPF/IRF	○	IRON PIPE / ROD FOUND
	CMF		CONCRETE MONUMENT FOUND
		△	UNMARKED ANGLE OR CORNER

A. "Boundary Survey Lands of City of Burlington off Lake Street", dated May 2010, prepared by Vermont Surveying & Engineering, Inc. Burlington Land Records.

1. Purpose of this survey and plat is to depict PROPOSED lot line adjustments between existing Parcels B and C (Reference Map A) resulting in reducing the area of Parcel C and increasing the area of Parcel B as shown. Other property lines shown MAY BE approximate, and are for reference purposes only.
2. Land areas shown are calculated to the existing or proposed property lines as shown and to the 95-foot contour of Lake Champlain. Submerged lands are subject to certain rights of the public under the so-called "Public Rights Doctrine".
3. This plat is based upon existing boundaries shown on Reference Plat A and several recent surveys conducted for the purpose of preparing site plans. Further field and records work MAY be required before this plat can be recorded. We noted the following discrepancies between our work and Reference Plat A:
 - a.) Reference A lists the existing Parcel B area as "1.15 acres". We calculate the area of te existing Parcel B as 1.859 acres.
 - b.) Reference A does not depict the lakeward boundary of said Parcel B as following the face of existing bulkhead or sea wall as we do.
4. Bearings shown are from Grid North, Vermont Coordinate System of 1983, based upon our GPS observations at the site.

<u>Parcel C</u>	<u>Parcel B</u>
1.024± Ac. Exist.	1.859± Ac. Exist.
+ 0.224± Ac. from Parcel B	- 0.224± Ac. to Parcel C
- 0.616 Ac. to Parcel B	+0.616 Ac. from Parcel C
0.632 ± Ac. Adjusted	2.251± Ac. Adjusted

To the best of my knowledge and belief this plat depicts the results of a survey conducted by me as described in "Survey Notes" hereon, based upon our analysis of land records and evidence found in the field. Existing boundaries shown are in substantial conformance with the records, except as noted.

ALSO

To the best of my knowledge and belief this plat is true and correct and was prepared from an actual survey of the property by me or under my supervision; that all monuments shown hereon actually exist or are marked as "proposed" and their location, size, type and materials are correctly shown. This statement valid only when accompanied by my original signature and seal below.

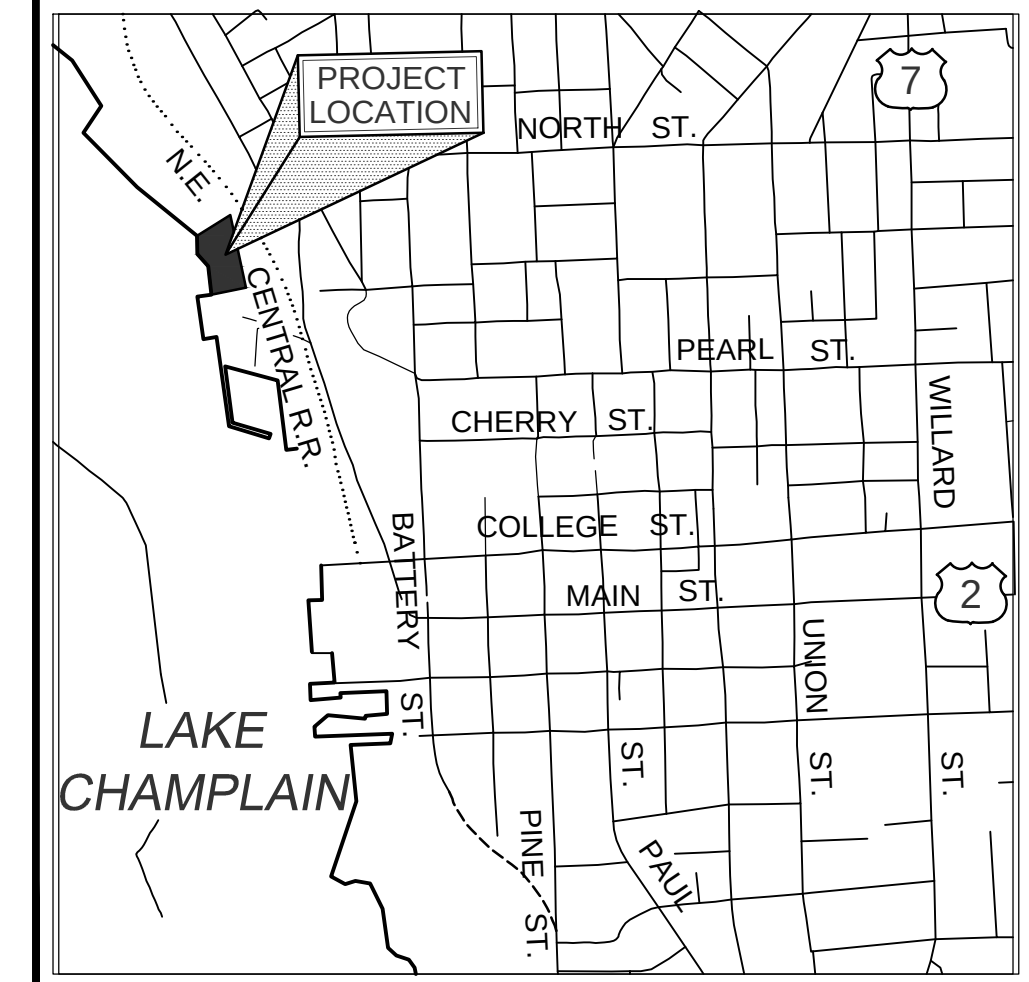
DRAFT
For Review
01/24/2017

Timothy R. Cowan
VT LS 597

APPROVED BY RESOLUTION OF THE CITY OF BURLINGTON
DEVELOPMENT REVIEW BOARD, BURLINGTON, VERMONT, ON THIS
____ DAY OF _____ 20____ SUBJECT TO ALL REQUIREMENTS AND
CONDITIONS OF THE COMPREHENSIVE DEVELOPMENT ORDINANCE OF
THE CITY OF BURLINGTON, VERMONT.

SIGNED THIS ____ DAY OF _____, 20____
BY _____

WITNESS _____ DRB CHAIR _____
ZONING PERMIT/CERTIFICATE OF APPROPRIATENESS # _____



Not to Scale

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 web: www.cea-vt.com
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DRAWN
CEA
CHECKED
TRC
APPROVED

DATE	CHECK	REVISION
1/27/17	DSM	PL REVISED FOR PARKING
1/30/17	DSM	REVISED EASEMENT AREA/CALLOUTS

*Proposed
Lot Line Adjustment
of Parcels B & C of
City of Burlington
at Proposed
**Burlington Harbor
Marina***

234 Penny Lane, Burlington, VT

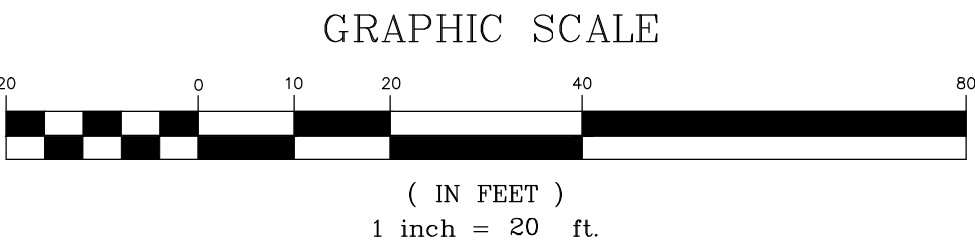
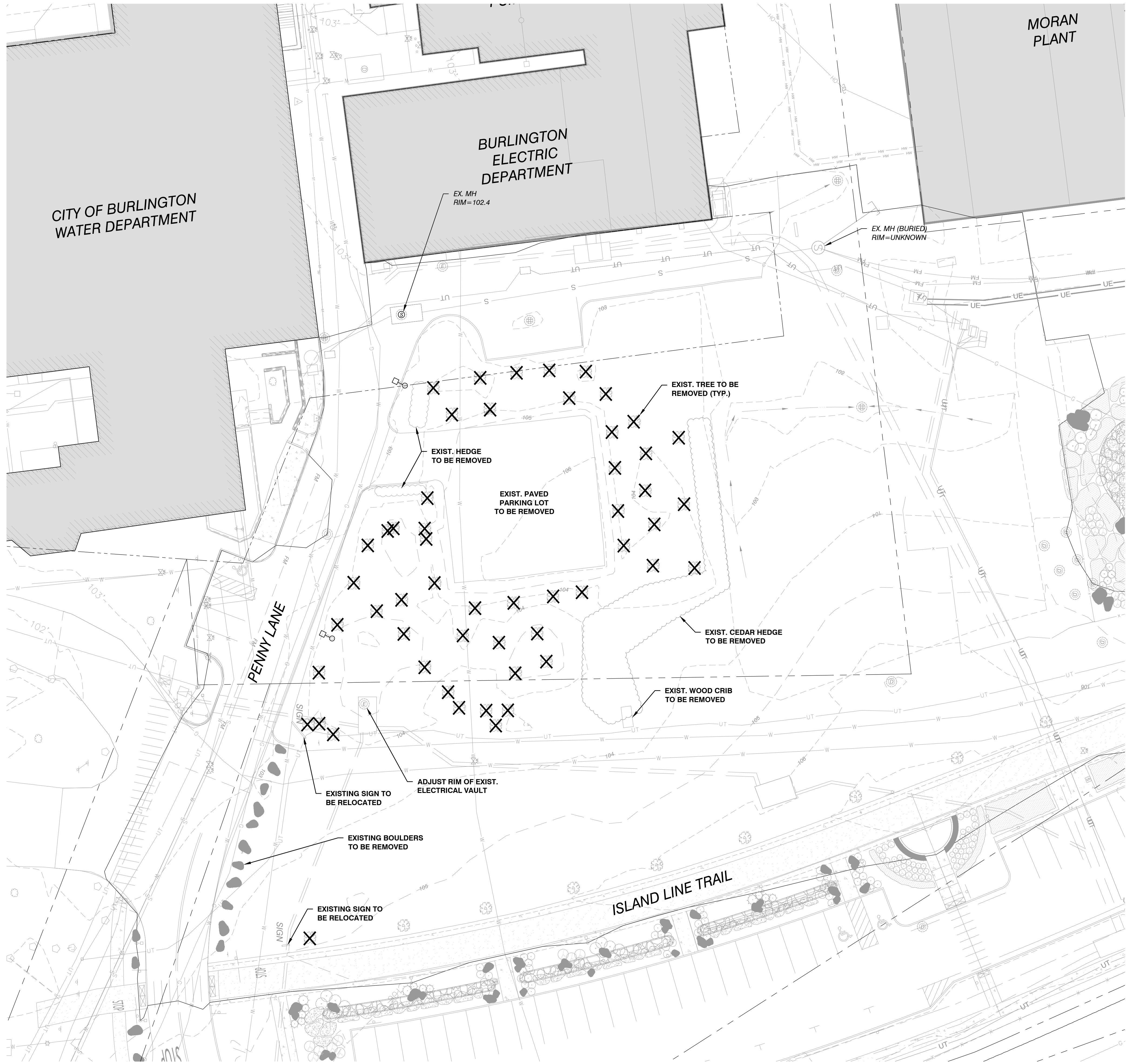
DATE
JAN. 24, 2017

SCALE
 $1'' = 40'$

PROJ. NO.
14115

DRAWING NUMBER

P1.0



SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

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DRAWN SAL	
CHECKED DSM	
APPROVED DSM	

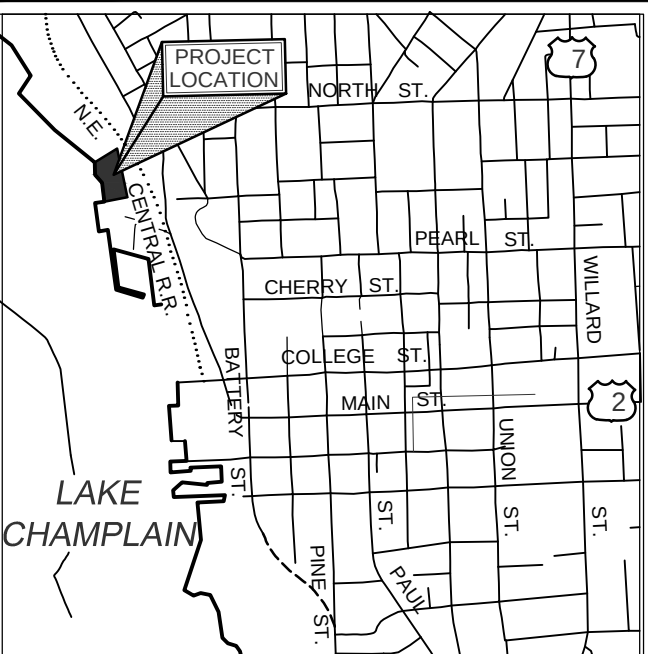
OWNER:

**BURLINGTON
HARBOR MARINA
LLC**
1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401

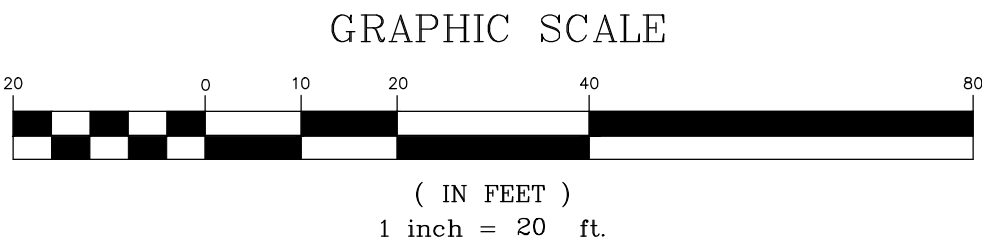
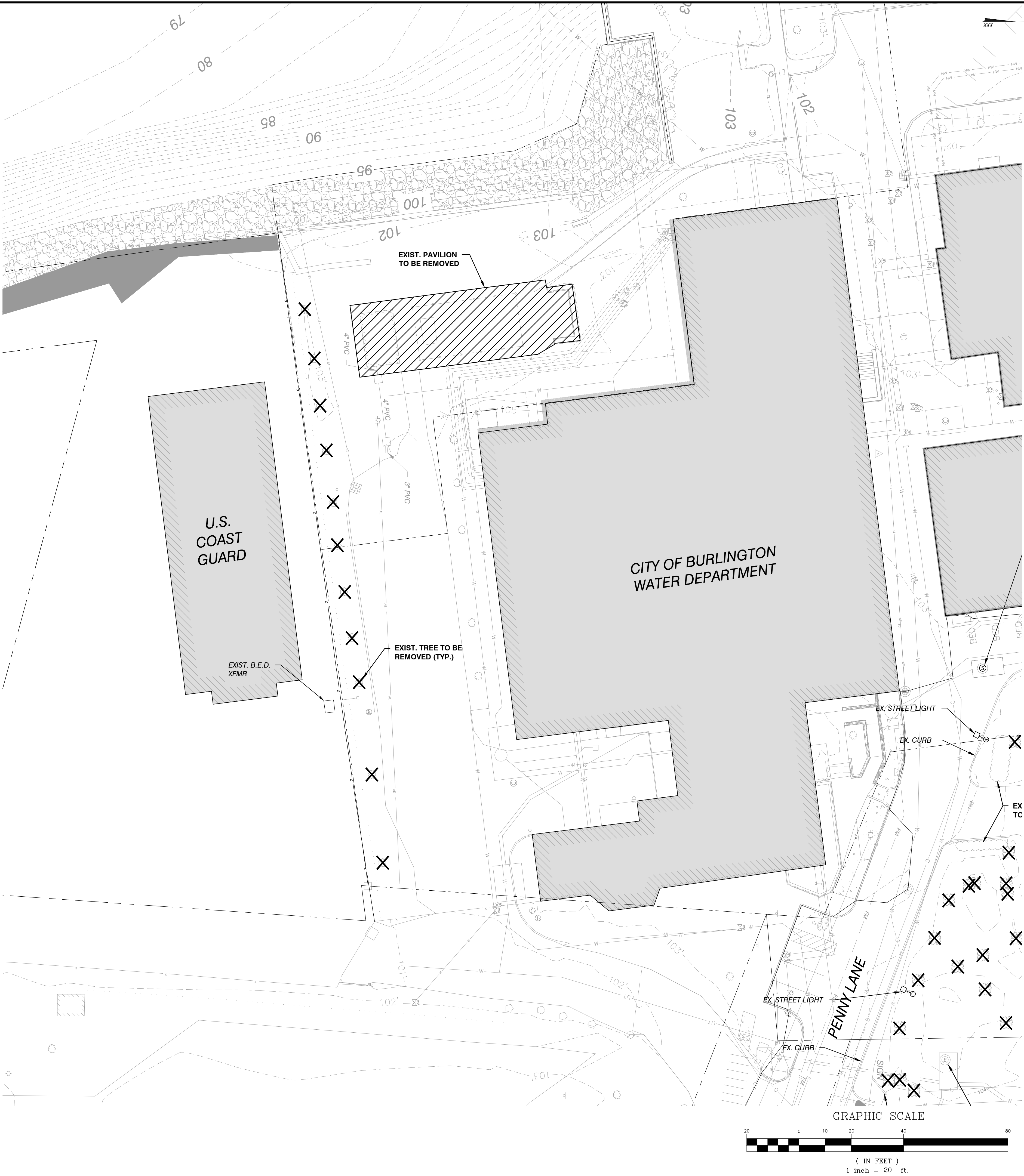


LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

**EXISTING
CONDITIONS/
DEMOLITION
PARTIAL SITE PLAN**

DATE JAN. 13, 2017	DRAWING NUMBER C1.1
SCALE 1" = 20'	
PROJ. NO. 14115	



SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

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DRAWN
SAL
CHECKED
DSM
APPROVED
DSM

OWNER:

**BURLINGTON
HARBOR MARINA
LLC**
1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

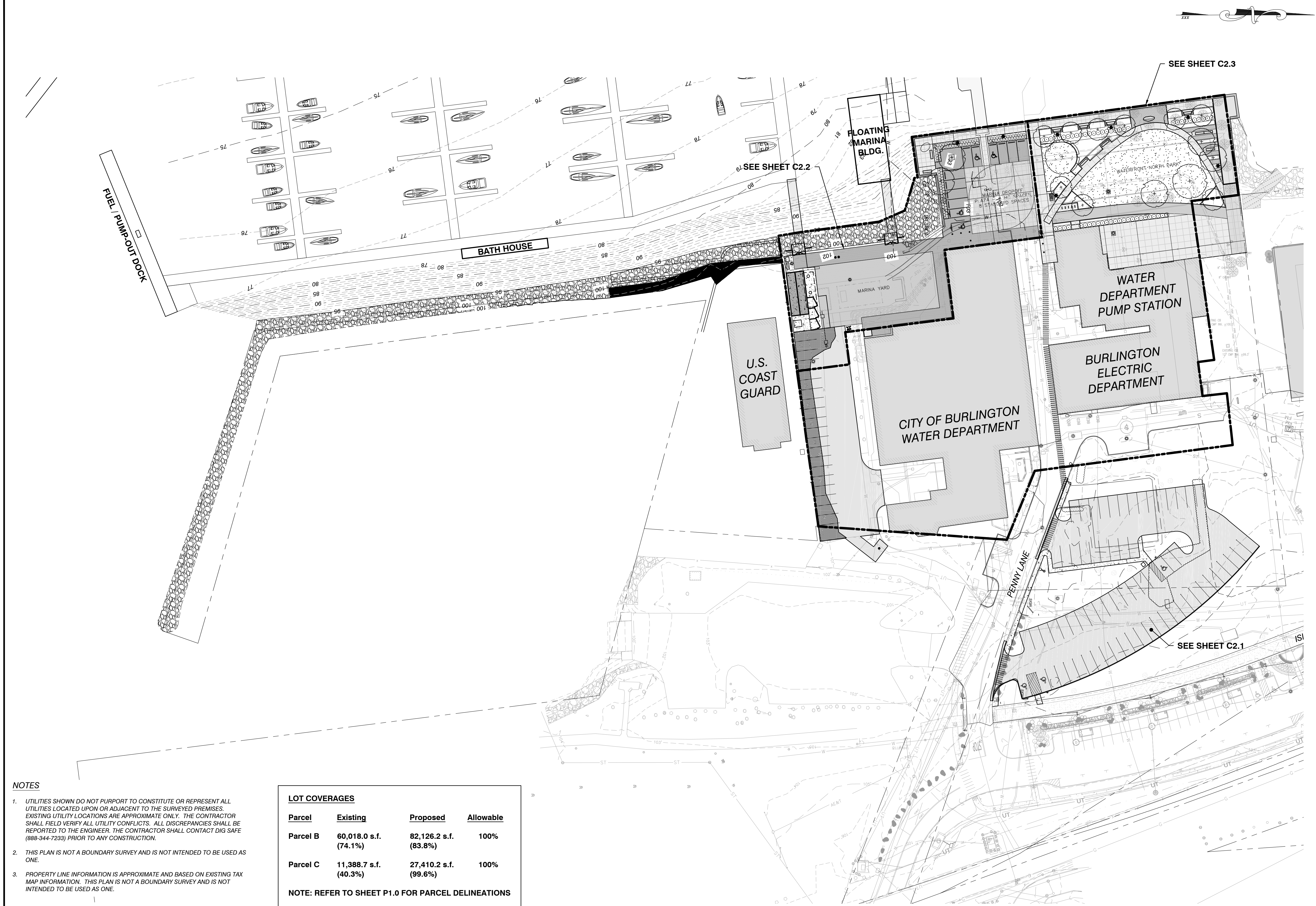
**EXISTING
CONDITIONS
PARTIAL SITE PLAN**

DATE
JAN. 13, 2017
SCALE
1" = 20'
PROJ. NO.
14115

DRAWING NUMBER

C1.2

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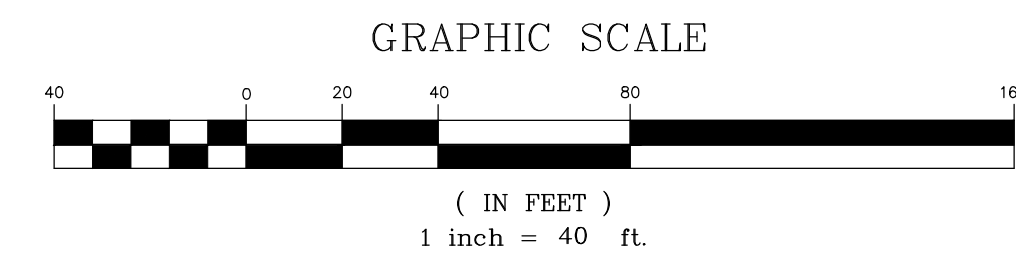
NOTES

- UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES. EXISTING UTILITY LOCATIONS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL FIELD VERIFY ALL UTILITY CONFLICTS. ALL DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. THE CONTRACTOR SHALL CONTACT DIG SAFE (888-344-7233) PRIOR TO ANY CONSTRUCTION.
- THIS PLAN IS NOT A BOUNDARY SURVEY AND IS NOT INTENDED TO BE USED AS ONE.
- PROPERTY LINE INFORMATION IS APPROXIMATE AND BASED ON EXISTING TAX MAP INFORMATION. THIS PLAN IS NOT A BOUNDARY SURVEY AND IS NOT INTENDED TO BE USED AS ONE.

LOT COVERAGES

Parcel	Existing	Proposed	Allowable
Parcel B	60,018.0 s.f. (74.1%)	82,126.2 s.f. (83.8%)	100%
Parcel C	11,388.7 s.f. (40.3%)	27,410.2 s.f. (99.6%)	100%

NOTE: REFER TO SHEET P1.0 FOR PARCEL DELINEATIONS



SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

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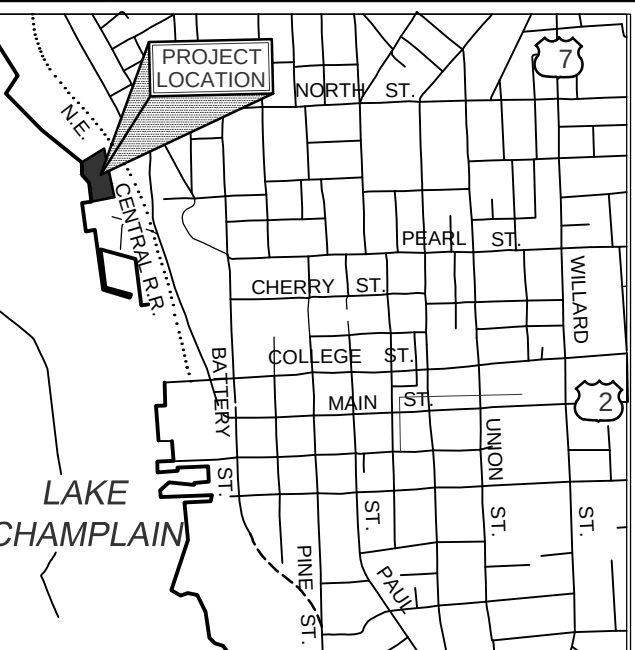
**BURLINGTON
HARBOR MARINA
LLC**

1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP

1" = 200'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES
1/27/17	DSM	PL REVISED FOR PARKING

**PROPOSED
CONDITIONS
OVERALL SITE
PLAN**

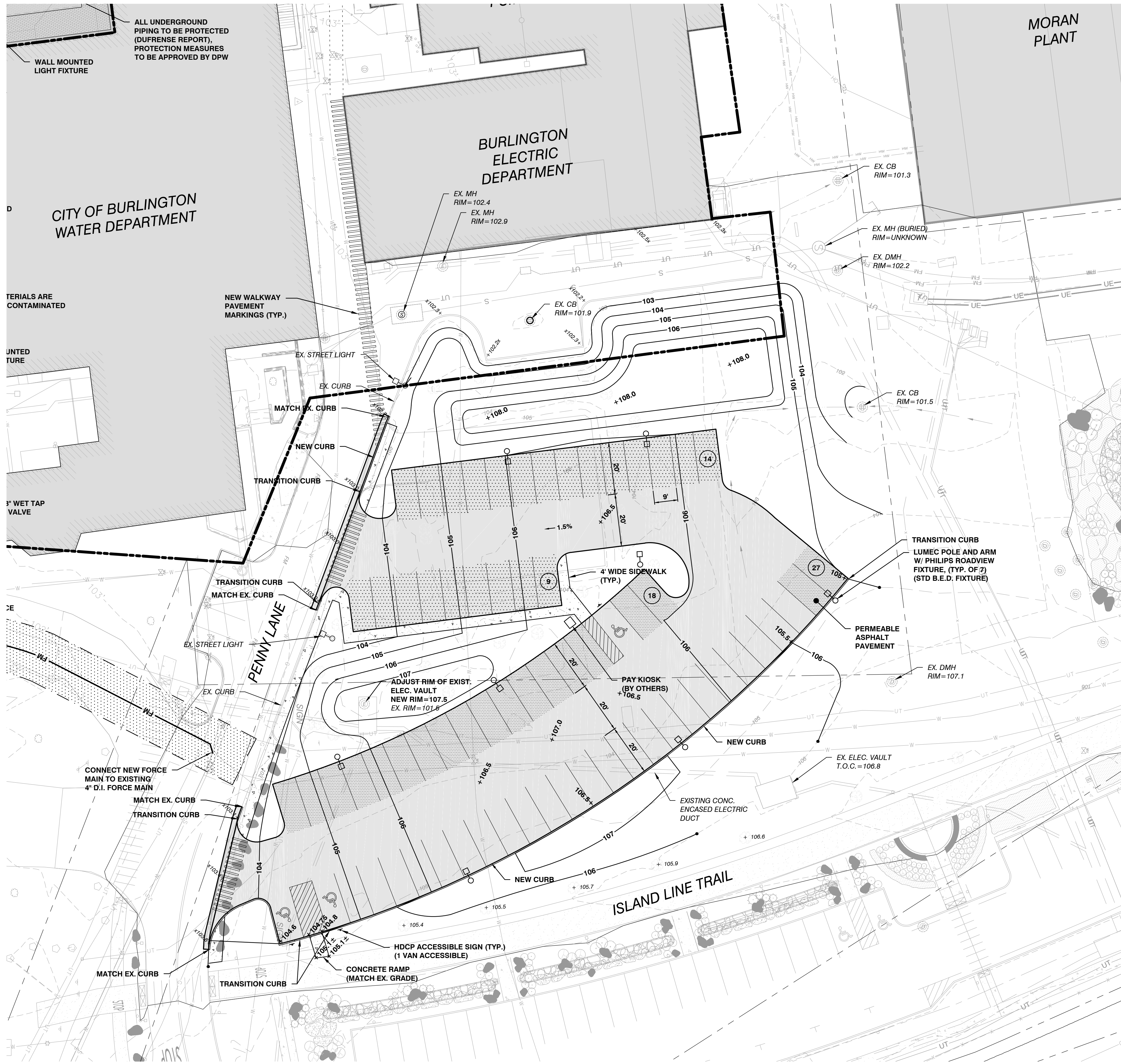
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JAN. 13, 2017

SCALE
1" = 40'

PROJ. NO.
14115

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OFF STREET PARKING REQUIREMENTS

MARINA	
96 SEASONAL SLIPS (0.5 / SLIP)	48 SPACES
(PER WAIVER)	
MARINA	
EAST LOT	42 SPACES
SOUTH LOT (EMPLOYEE)	4 SPACES
PLAZA LOT (HDCP ACCESS.)	2 SPACES
	48 SPACES
BIKE PARKING	
SHORT TERM (100 USERS x 0.1)	10 SPACES
LONG TERM (1/10) (EMPLOYEE)	1 SPACES
TOTAL REQUIRED	11 SPACES
TOTAL PROVIDED	11 SPACES

WFN (EAST LOT) PARKING SUMMARY

MIN. REQUIRED SPACES
42 MARINA
26 COMMUNITY SAILING CENTER
68 REQUIRED SPACES
68 PROPOSED SPACES
73 PREVIOUSLY PERMITTED SPACES

3 ACCESSIBLE SPACES REQUIRED (TOTAL)
3 ACCESSIBLE SPACES PROVIDED (TOTAL)
1 VAN ACCESSIBLE SPACE REQUIRED
1 VAN ACCESSIBLE SPACES PROVIDED

EAST LOT PARKING RESERVED SPACES

- 23 SPACES FOR EXCLUSIVE MARINA USE
MAY TO OCT.
- 19 SPACES FOR EXCLUSIVE MARINA USE
WEEKENDS AND HOLIDAYS - MAY TO OCT.

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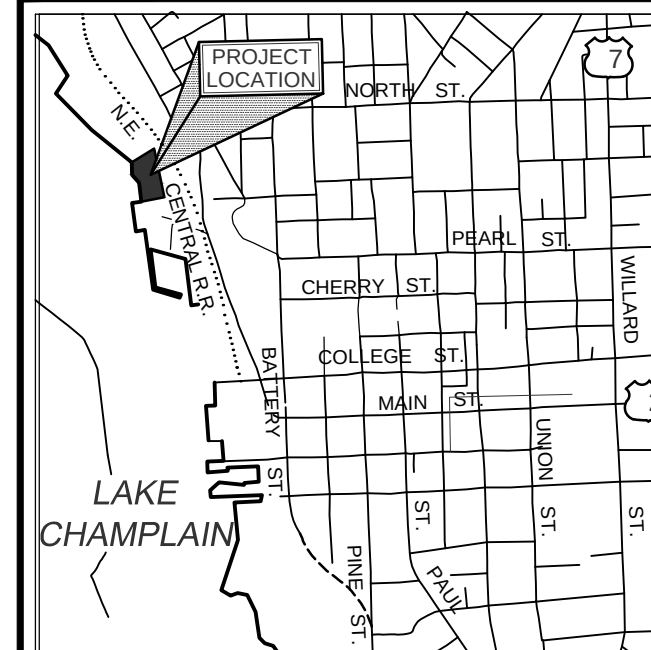
BURLINGTON
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BURLINGTON
HARBOR MARINA

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

PROPOSED
CONDITIONS
PARTIAL SITE PLAN

DATE

JAN. 13, 2017

SCALE

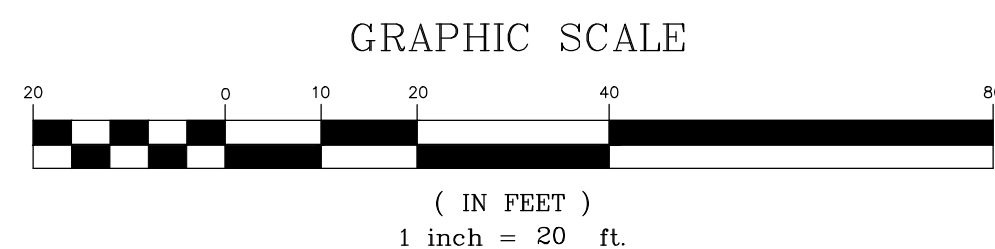
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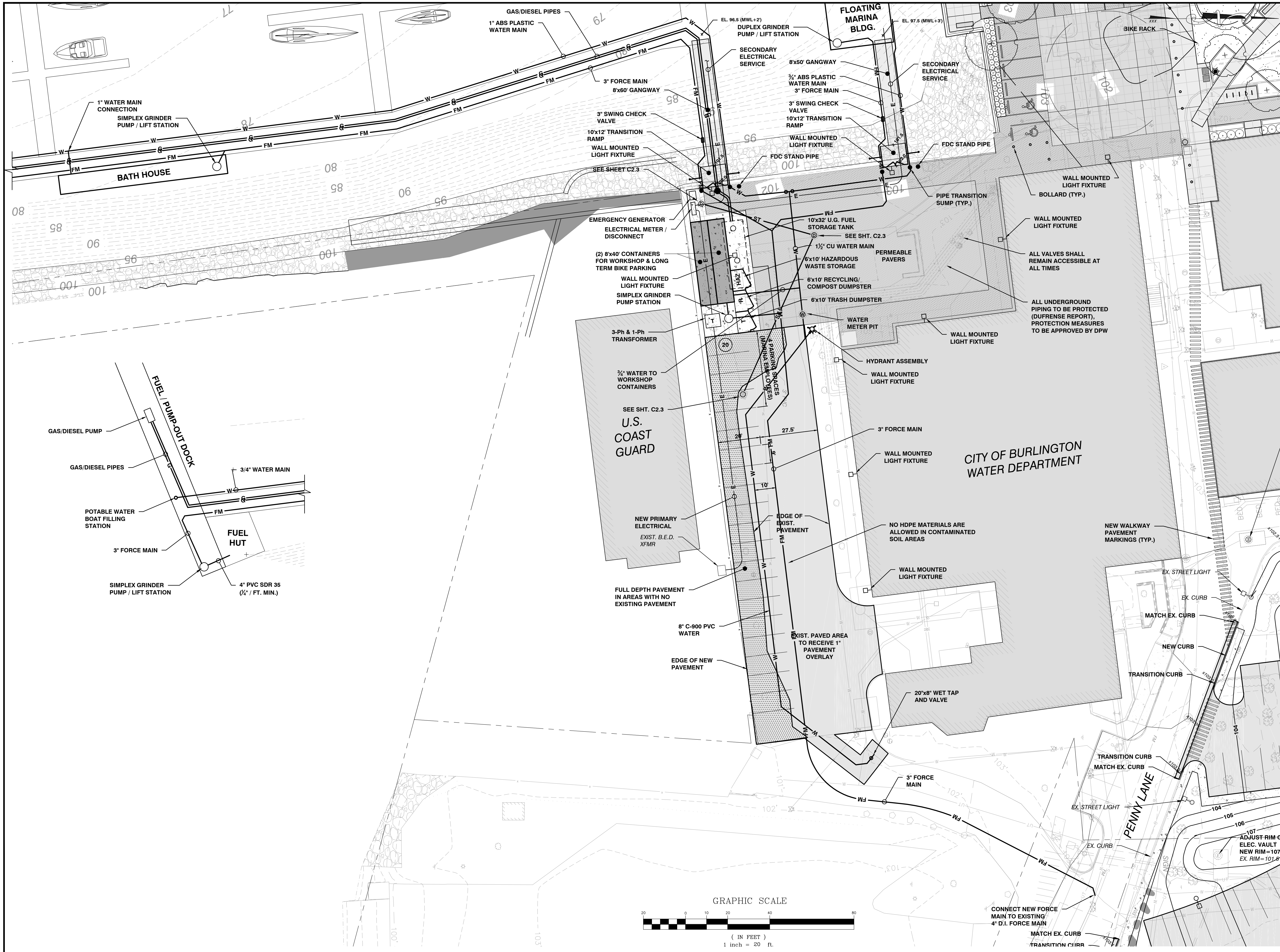
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BURLINGTON VT 05401

PROJECT:

**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

**PROPOSED
CONDITIONS
PARTIAL SITE PLAN**

DATE
JAN. 13, 2017

SCALE

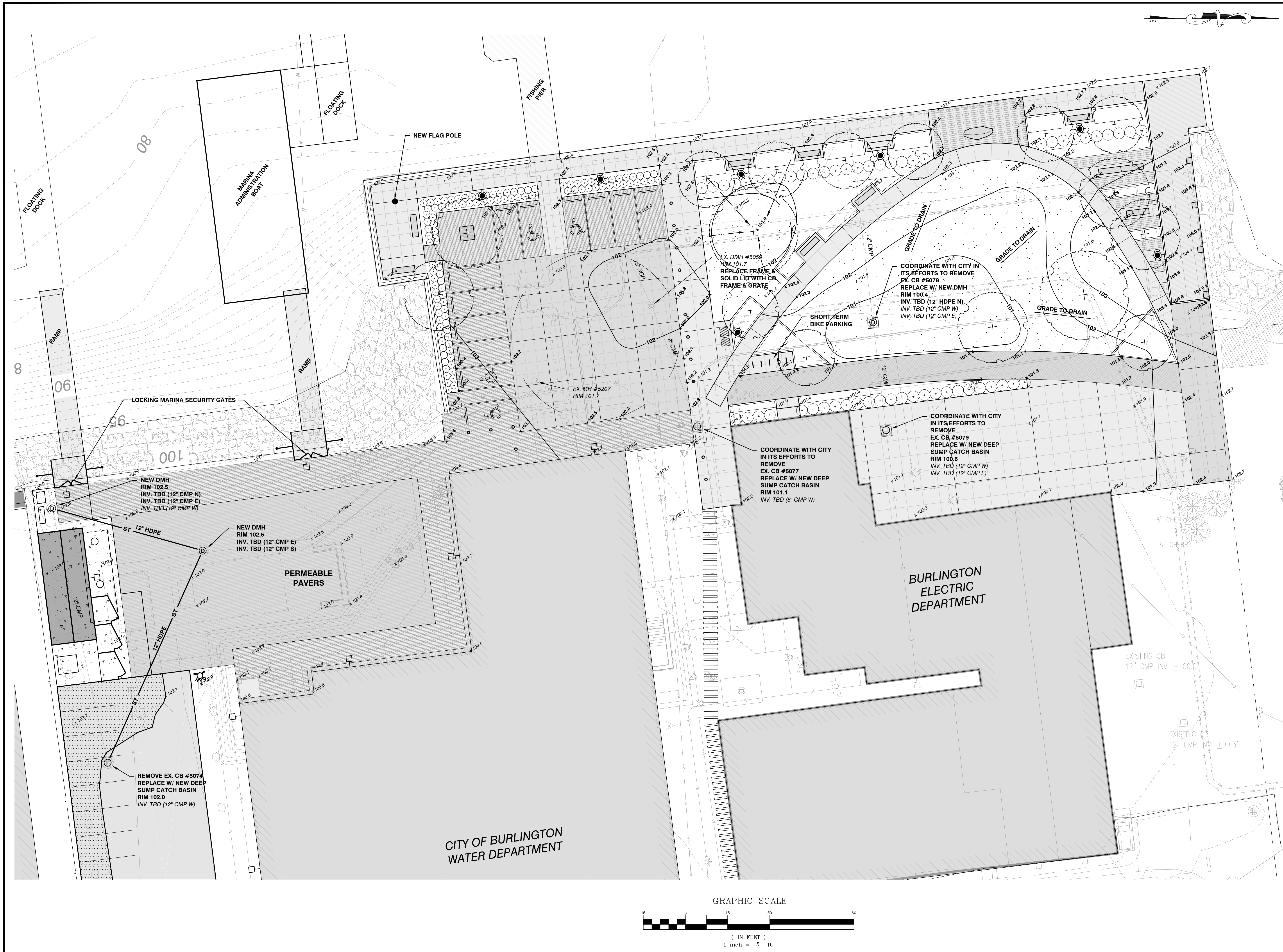
1" = 20'

PROJ. NO.

14115

DRAWING NUMBER

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HARBOR MARINA**

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LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

PROPOSED
CONDITIONS
PARTIAL SITE PLAN

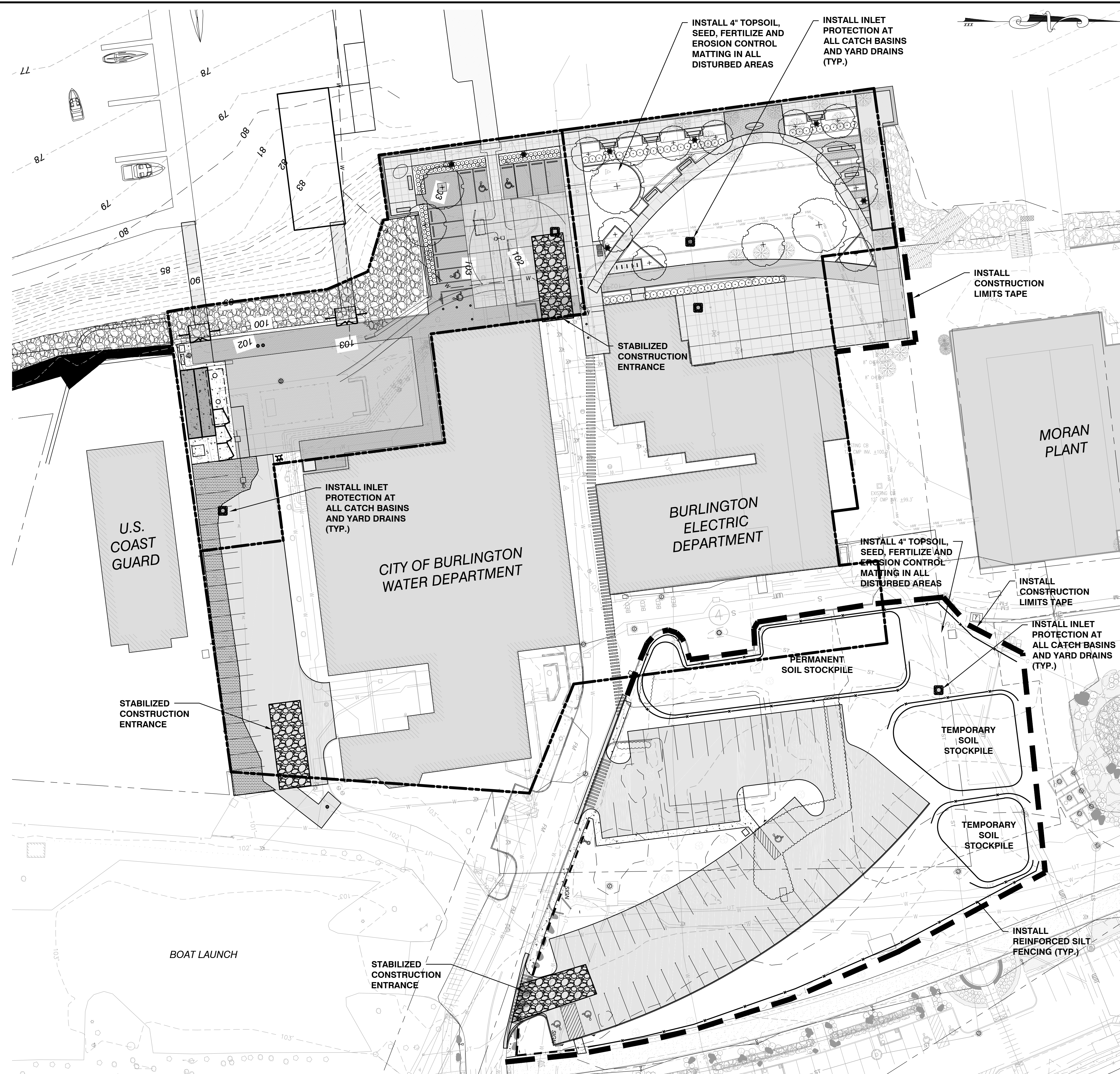
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JAN. 13, 2017

SCALE
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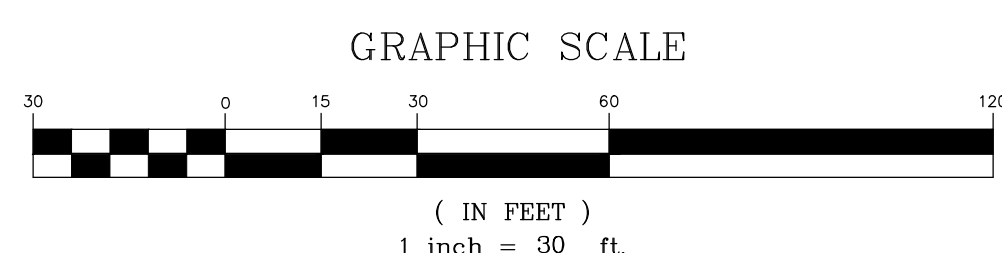
PROJ. NO.
14115

DRAWING NUMBER

C2.3



NOTE:
ALL CONTAMINATED SOILS SHALL BE MANAGED
PER THE 'CORRECTIVE ACTION PLAN, MORAN
CENTER AND WATERFRONT NORTH' GUIDELINES



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LLC**
1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:
**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401

LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

PROPOSED
EPSC PLAN

DATE
JAN. 13, 2017
SCALE
1" = 30'
PROJ. NO.
14115

DRAWING NUMBER
C3.0

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Introduction

This project is subject to the terms and conditions of the authorization from the State of Vermont to discharge construction related storm water runoff.

Coverage under the State Construction General Permit 3-9020 is required for any construction activity that disturbs 1 or more acres of land, or is part of a larger development plan that will disturb 1 or more acres.

This project has been deemed to qualify as a Low Risk Site which is subject to the erosion prevention and sediment control (EPSC) standards set for in the State of Vermont's

Low Risk Site Handbook for Erosion Prevention and Sediment Control

The following narrative and implementation requirements represent the minimum standard for which this site is required to be maintained as regulated by the State of Vermont.

Any best management practices (BMP's) depicted on the project's EPSC Site plan which go beyond the Handbook requirements are considered to be integral to the management of the site and represent components of the municipal EPSC approval for the project which shall be implemented.

The EPSC plan depicts one snap shot in time of the site. All construction sites are fluid in their day to day exposures and risks as it relates to minimizing sediment loss from the site. It is the responsibility of the Contractor to implement the necessary BMP's to comply with the Low Risk Handbook standards outlined on this sheet based on the interim site disturbance conditions which may or may not be shown on the EPSC Site Plan.

Specific BMP's which are critical to allowing the project to be considered a Low risk site include the items checked below:

- Limit the amount of disturbed earth to two acres or less at any one time.
- There shall be a maximum of 7 consecutive days of disturbed earth exposure in any location before temporary or final stabilization is implemented.

- Mark Site Boundaries

Purpose:

Mark the site boundaries to identify the limits of construction. Delineating your site will help to limit the area of disturbance, preserve existing vegetation and limit erosion potential on the site.

How to comply:

Before beginning construction, walk the site boundaries and flag trees, post signs, or install orange safety fence. Fence is required on any boundary within 50 feet of a stream, lake, pond or wetland, unless the area is already developed (existing roads, buildings, etc.)

- Limit Disturbance Area

Purpose:

Limit the amount of soil exposed at one time to reduce the potential erosion on site.

Requirements:

The permitted disturbance area is specified on the site's written authorization to discharge. Only the acreage listed on the authorization form may be exposed at any given time.

How to comply:

Plan ahead and phase the construction activities to ensure that no more than the permitted acreage is disturbed at one time. Be sure to properly stabilize exposed soil with seed and mulch or erosion control matting before beginning work in a new section of the site.

- Stabilize Construction Entrance

Purpose:

A stabilized construction entrance helps remove mud from vehicle wheels to prevent tracking onto streets.

Requirements:

If there will be any vehicle traffic off of the construction site, you must install a stabilized construction entrance before construction begins.

How to install

Rock Size: Use a mix of 1 to 4 inch stone

Depth: 8 inches minimum

Width: 12 feet minimum

Length: 40 feet minimum (or length of driveway, if shorter)

Geotextile: Place filter cloth under entire gravel bed

Maintenance:

Redress with clean stone as required to keep sediment from tracking onto the street.

- Install Silt Fence

Purpose:

Silt fences intercept runoff and allow suspended sediment to settle out.

Requirements:

Silt fence must be installed:

- on the downhill side of the construction activities
- between any ditch, swale, storm sewer inlet, or waters of the State and the disturbed soil

* Hay bales must not be used as sediment barriers due to their tendency to degrade and fall apart.

Where to place:

- Place silt fence on the downhill edge of bare soil. At the bottom of slopes, place fence 10 feet downhill from the end of the slope (if space is available).
- Ensure the silt fence catches all runoff from bare soil.
- Maximum drainage area is ¼ acre for 100 feet of silt fence.
- Install silt fence across the slope (not up and down hills)
- Install multiple rows of silt fence on long hills to break up flow.
- Do not install silt fence across ditches, channels, or streams or in stream buffers.

How to install silt fence:

- Dig a trench 6 inches deep across the slope
- Unroll silt fence along the trench
- Ensure stakes are on the downhill side of the fence
- Join fencing by rolling the end stakes together
- Drive stakes in against downhill side of trench
- Drive stakes until 16 inches of fabric is in trench
- Push fabric into trench; spread along bottom
- Fill trench with soil and pack down

Maintenance:

- Remove accumulated sediment before it is halfway up the fence.
- Ensure that silt fence is trenched in ground and there are no gaps.

- Divert Upland Runoff

Purpose:

Diversion berms intercept runoff from above the construction site and direct it around the disturbed area. This prevents clean water from becoming muddied with soil from the construction site.

Requirements:

If storm water runs onto your site from upslope areas and your site meets the following two conditions, you must install a diversion berm before disturbing any soil.

- You plan to have one or more acres of soil exposed at any one time (excluding roads).
- Average slope of the disturbed area is 20% or steeper.

How to install:

- Compact the berm with a shovel or earth-moving equipment.
- Seed and mulch berm or cover with erosion control matting immediately after installation.
- Stabilize the flow channel with seed and straw mulch or erosion control matting. Line the channel with 4 inch stone if the channel slope is greater than 20%.
- Ensure the berm drains to an outlet stabilized with riprap. Ensure that there is no erosion at the outlet.
- The diversion berm shall remain in place until the disturbed areas are completely stabilized.

- Slow Down Channelized Runoff

Purpose:

Stone check dams reduce erosion in drainage channels by slowing down the storm water flow.

Requirements:

If there is a concentrated flow (e.g. in a ditch or channel) of storm water on your site, then you must install stone check dams. Hay bales must not be used as check dams.

How to install:

Height: No greater than 2 feet. Center of dam should be 9 inches lower than the side elevation

Side slopes: 2:1 or flatter

Stone size: Use a mixture of 2 to 9 inch stone

Width: Dams should span the width of the channel and extend up the sides of the banks

Spacing: Space the dams so that the bottom (toe) of the upstream dam is at the elevation of the top (crest) of the downstream dam. This spacing is equal to the height of the check dam divided by the channel slope.

Spacing (in feet) = Height of check dam (in feet)/Slope in channel (ft/ft)

Maintenance:

Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam. If significant erosion occurs between check dams, a liner of stone should be installed.

- Construct Permanent Controls

Purpose:

Permanent storm water treatment practices are constructed to maintain water quality, ensure groundwater flows, and prevent downstream flooding. Practices include detention ponds and wetlands, infiltration basins, and storm water filters.

Requirements:

If the total impervious* area on your site, or within the common plan of development, will be 1 or more acres, you must apply for a State Storm water Discharge Permit and construct permanent storm water treatment practices on your site. These practices must be installed before the construction of any impervious surfaces.

How to comply:

Contact the Vermont Storm water Program and follow the requirements in the Vermont Storm water Management Manual. The Storm water Management Manual is available at: www.vtwaterquality.org/stormwater.htm

*An impervious surface is a manmade surface, including, but not limited to, paved and unpaved roads, parking areas, roofs, driveways, and walkways, from which precipitation runs off rather than infiltrates.

- Stabilize Exposed Soil

Purpose:

Seeding and mulching, applying erosion control matting, and hydroseeding are all methods to stabilize exposed soil. Mulches and matting protect the soil surface while grass is establishing.

Requirements:

All areas of disturbance must have temporary or permanent stabilization within 7, 14, or 21 days of initial disturbance, as stated in the project authorization. After this time, any disturbance in the area must be stabilized at the end of each work day.

The following exceptions apply:

- Stabilization is not required if earthwork is to continue in the area within the next 24 hours and there is no precipitation forecast for the next 24 hours.
- Stabilization is not required if the work is occurring in a self-contained excavation (i.e. no outlet) with a depth of 2 feet or greater (e.g. house foundation excavation, utility trenches).

All areas of disturbance must have permanent stabilization within 48 hours of reaching final grade.

How to comply:

Prepare bare soil for seeding by grading the top 3 to 6 inches of soil and removing any large rocks or debris.

Seeding Rates for Temporary Stabilization

April 15 - Sept. 15 -- Ryegrass (annual or perennial): 20 lbs/acre

Sept. 15 - April 15 -- Winter rye: 120 lbs/acre

Seeding Rates for Final Stabilization:Choose

Seeding Rates for Final Stabilization:				
Choose from:	Variety	Lbs. /acre	Lbs. /1000 sq. ft.	
Birds foot trefoil	Empire/Pardue	51	0.1	
or				
Common white clover	Common	8	0.2	
plus				
Tall Fescue	KY-31/Rebel	10	0.25	
plus				
Redtop	Common	2		
or				
Ryegrass (perennial)	Pennfine/Linn	5	0.1	

1-Mtx2.5 each of Empire and Pardue OR 2.5 lbs. of Birds foot and 2.5 lbs. white clover per acre

Mulching Rates

April 15 - Sept. 15 -- Hay or Straw: 1 inch deep (1-2 bales/1000 s.f.)
Sept.15 - April 15 -- Hay or Straw: 2 in. deep (2-4 bales/1000 s.f.)

Erosion Control Matting

As per manufacturer's instructions

Hydroseed

As per manufacturer's instructions

- Winter Stabilization

Purpose:

Managing construction sites to minimize erosion and prevent sediment loading of waters is a year-round challenge. In Vermont, this challenge becomes even greater during the late fall, winter, and early spring months.

'Winter construction' as discussed here, describes the period between October 15 and April 15, when erosion prevention and sediment control is significantly more difficult.

Rains in late fall, thaws throughout the winter, and spring melt and rains can produce significant flows over frozen and saturated ground, greatly increasing the potential for erosion.

Requirements for Winter Shutdown:

For those projects that will complete earth disturbance activities prior to the winter period (October 15), the following requirements must be adhered to:

- For areas to be stabilized by vegetation, seeding shall be completed no later than September 15 to ensure adequate growth and cover.
- If seeding is not completed by September 15, additional non-vegetative protection must be used to stabilize the site for the winter period. This includes use of Erosion Control Matting or netting of a heavy mulch layer. Seeding with winter rye is recommended to allow for early germination during wet spring conditions.
- Where mulch is specified, apply roughly 2 inches with an 80-90% cover. Mulch should be tracked in or stabilized with netting in open areas vulnerable to wind.

Requirements for Winter Construction

If construction activities involving earth disturbance continue past October 15 or begin before April 15, the following requirements must be adhered to:

- Enlarged access points, stabilized to provide for snow stockpiling.
- Limits of disturbance moved or replaced to reflect boundary of winter work.
- A snow management plan prepared with adequate storage and control of meltwater, requiring cleared snow to be stored down slope of all areas of disturbance and out of storm water treatment structures.
- A minimum 25 foot buffer shall be maintained from perimeter controls such as silt fence.
- In areas of disturbance that drain to a water body within 100 feet, two rows of silt fence must be installed along the contour.
- Drainage structures must be kept open and free of snow and ice dams.
- Silt fence and other practices requiring earth disturbance must be installed ahead of frozen ground.
- Mulch used for temporary stabilization must be applied at double the standard rate, or a minimum of 3 inches with an 80-90% cover.
- To ensure cover of disturbed soil in advance of a melt event, areas of disturbed soil must be stabilized at the end of each work day, with the following exceptions:
 - If no precipitation within 24 hours is forecast and work will resume in the same disturbed area within 24 hours, daily stabilization is not necessary.
 - Disturbed areas that collect and retain runoff, such as house foundations or open utility trenches.
- Prior to stabilization, snow or ice must be removed to less than 1 inch thickness.
- Use stone to stabilize areas such as the perimeter of buildings under construction or where construction vehicle traffic is anticipated. Stone paths should be 10 to 20 feet wide to accommodate vehicular traffic.

- Stabilize Soil at Final Grade

Purpose:

Stabilizing the site with seed and mulch or erosion control matting when it reaches final grade is the best way to prevent erosion while construction continues.

Requirements:

Within 48 hours of final grading, the exposed soil must be seeded and mulched or covered with erosion control matting.

How to comply:

Bring the site or sections of the site to final grade as soon as possible after construction is completed. This will reduce the need for additional sediment and erosion control measures and will reduce the total disturbed area.

For seeding and mulching rates, follow the specifications under Rule 8, Stabilizing Exposed Soil.

- Dewatering Activities

Purpose:

Treat water pumped from dewatering activities so that it is clear when leaving the construction site.

Requirements:

Water from dewatering activities that flows off of the construction site must be clear. Water must not be pumped into storm sewers, lakes, or wetlands unless the water is clear.

How to comply:

Using sock filters or sediment filter bags on dewatering discharge hoses or pipes, discharge water into silt fence enclosures installed in vegetated areas away from waterways. Remove accumulated sediment after the water has dispersed and stabilize the area with seed and mulch.

- Inspect Your Site

Purpose:

Perform site inspections to ensure that all sediment and erosion control practices are functioning properly. Regular inspections and maintenance of practices will help to reduce costs and protect water quality.

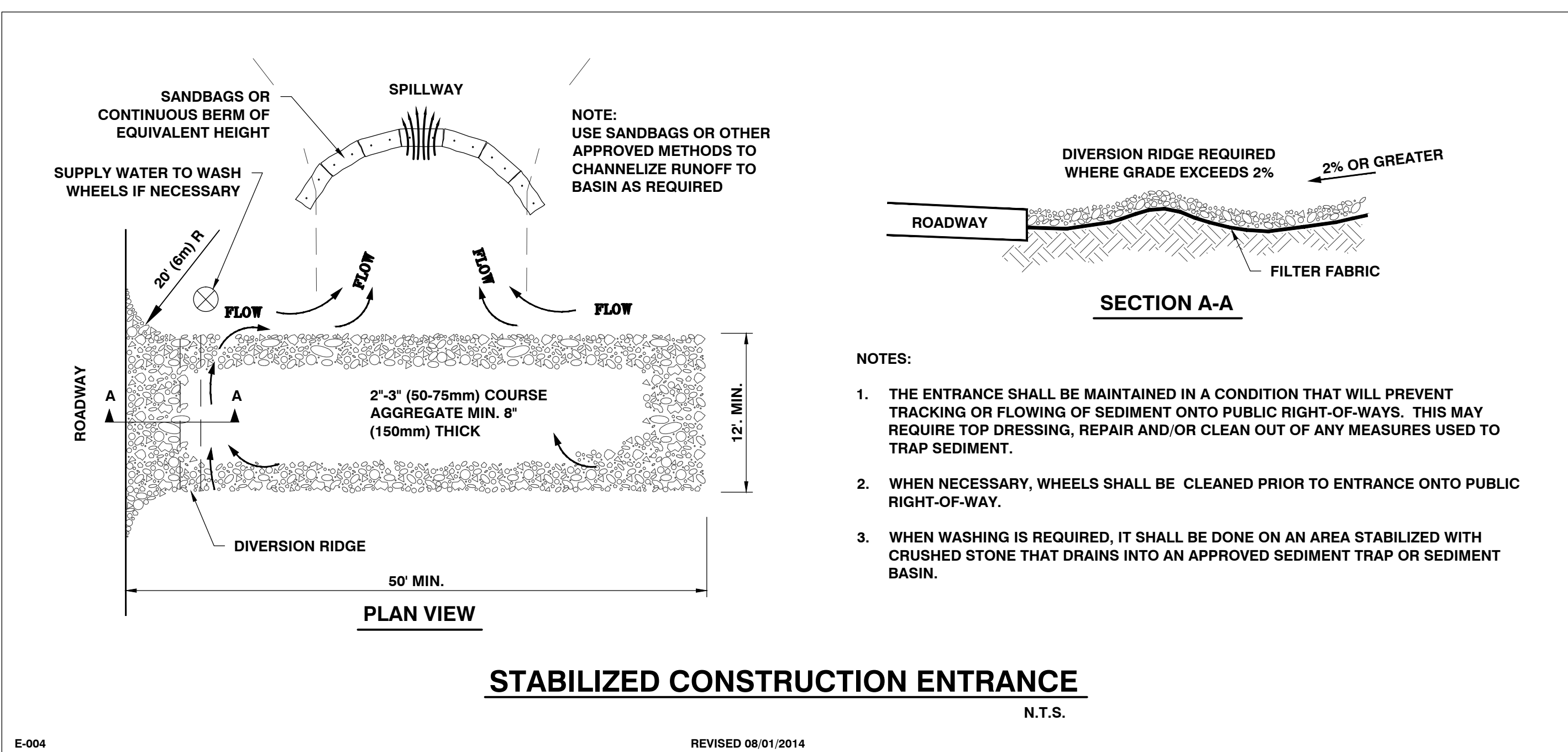
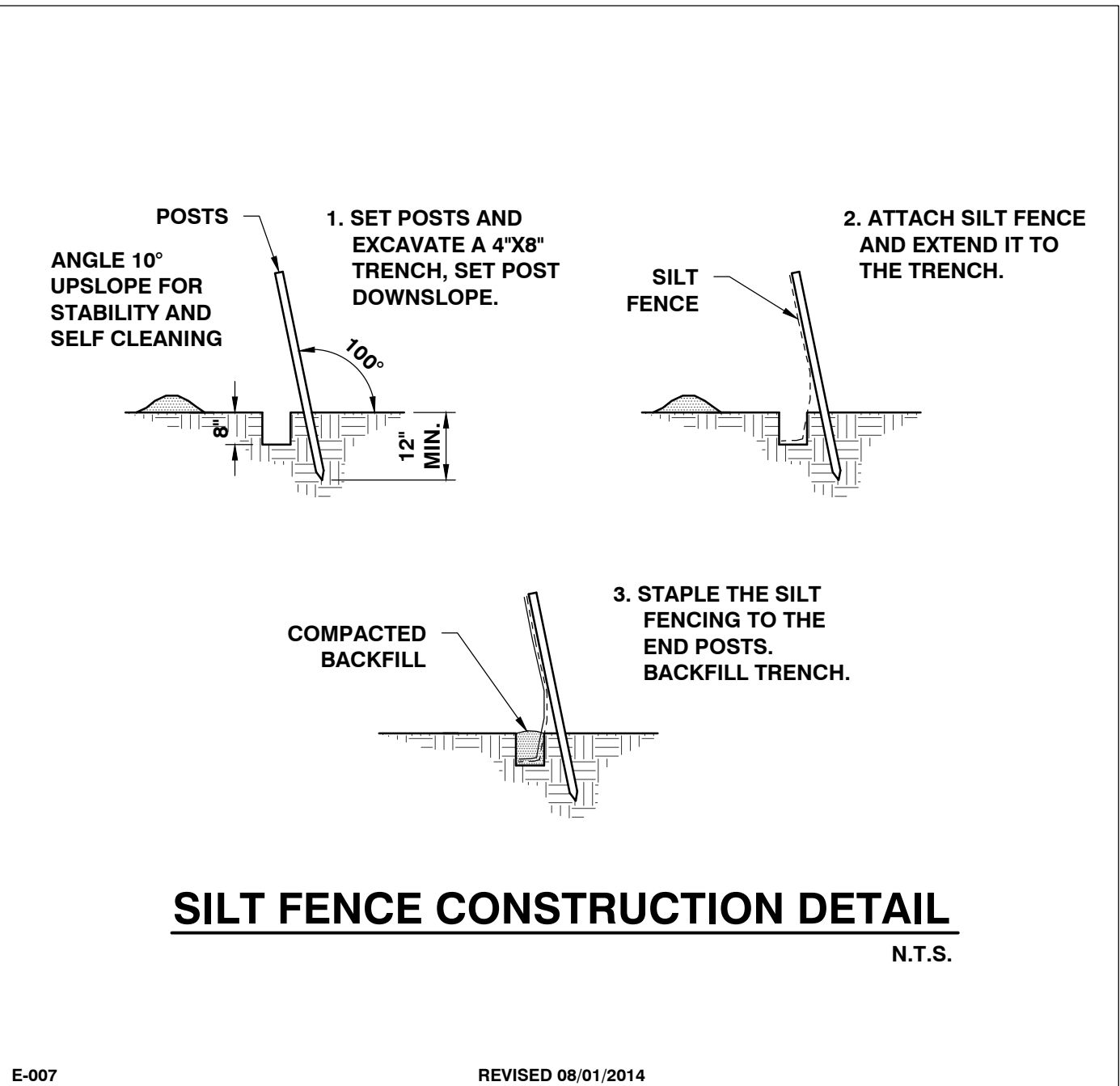
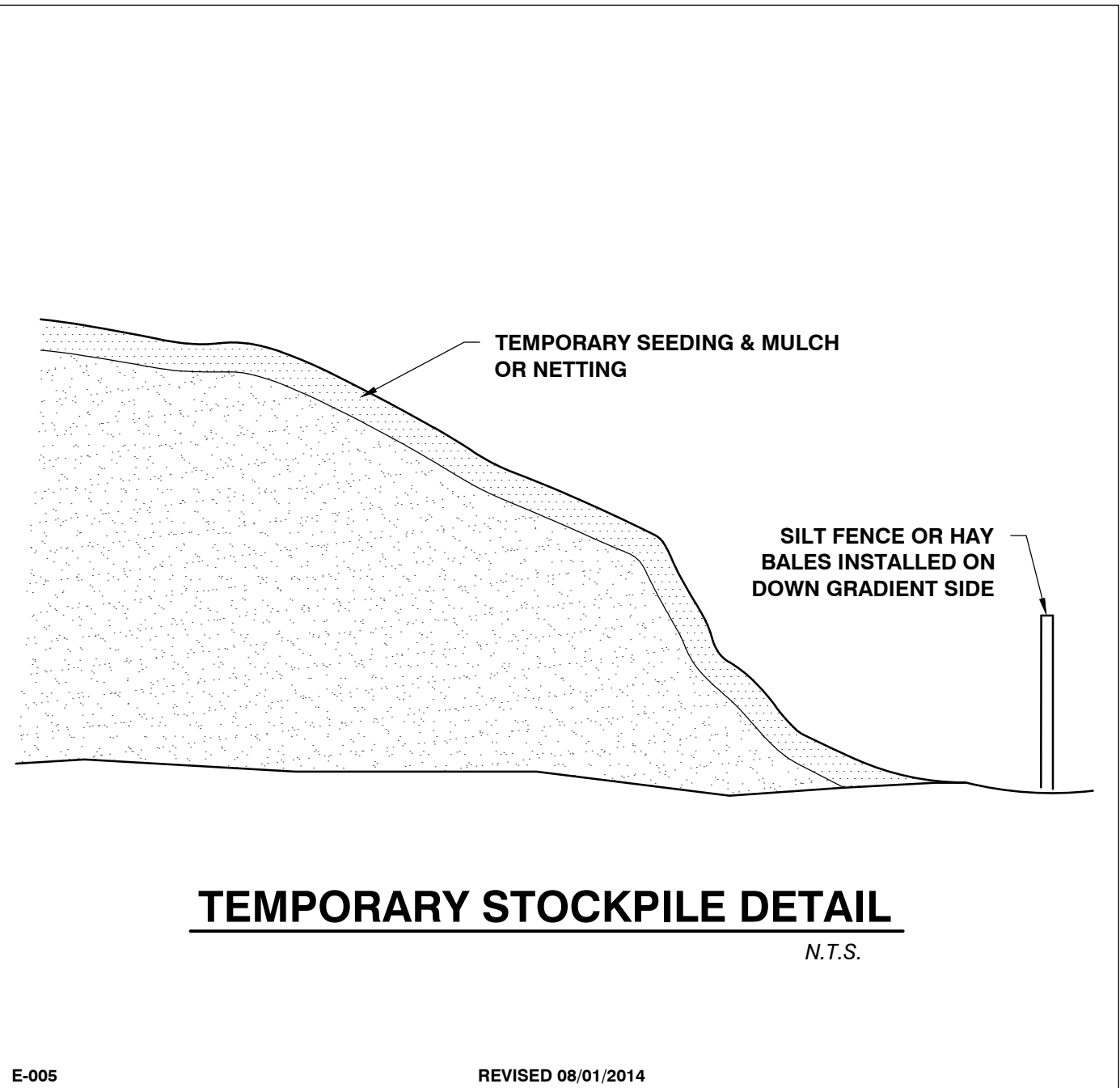
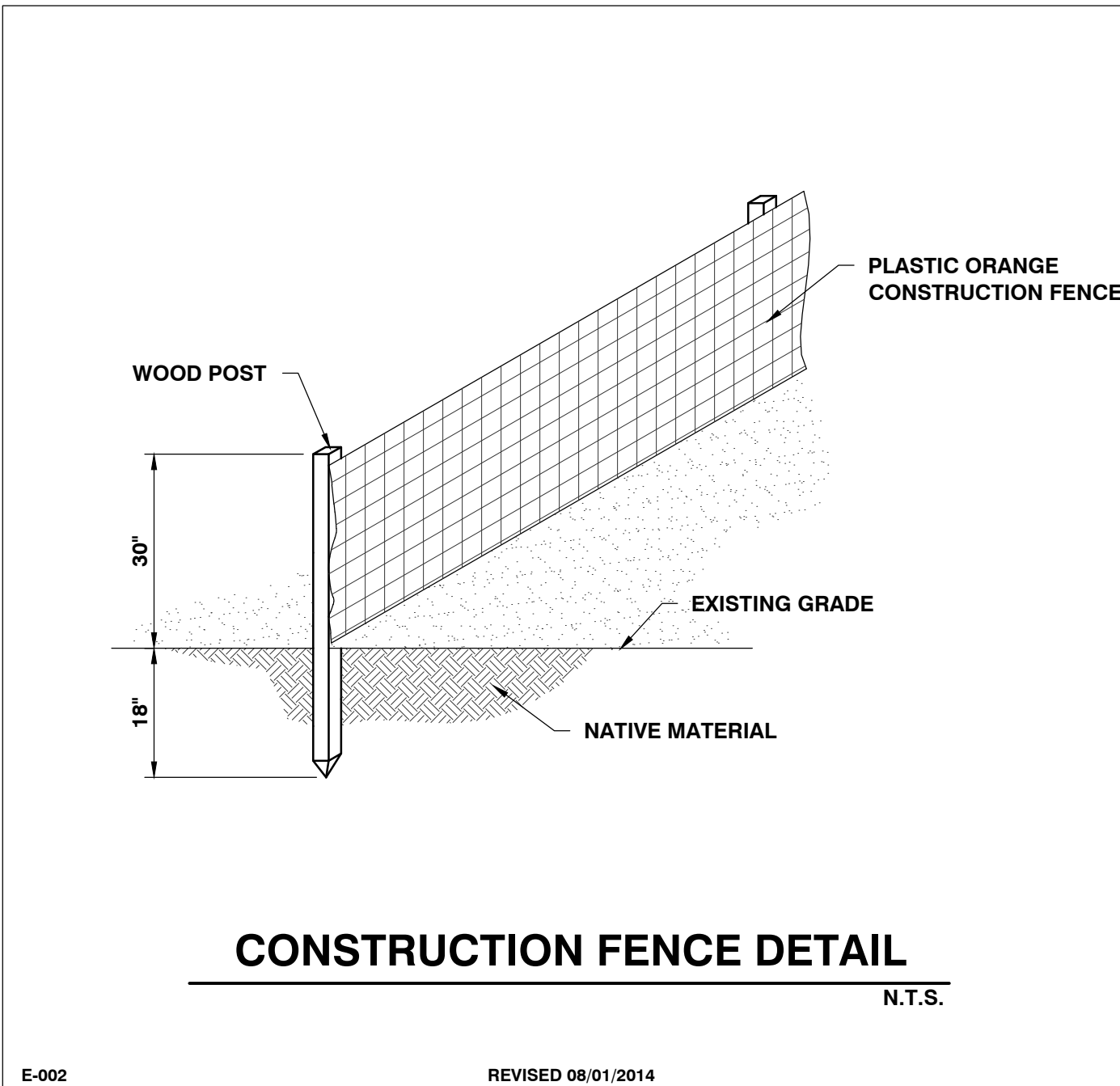
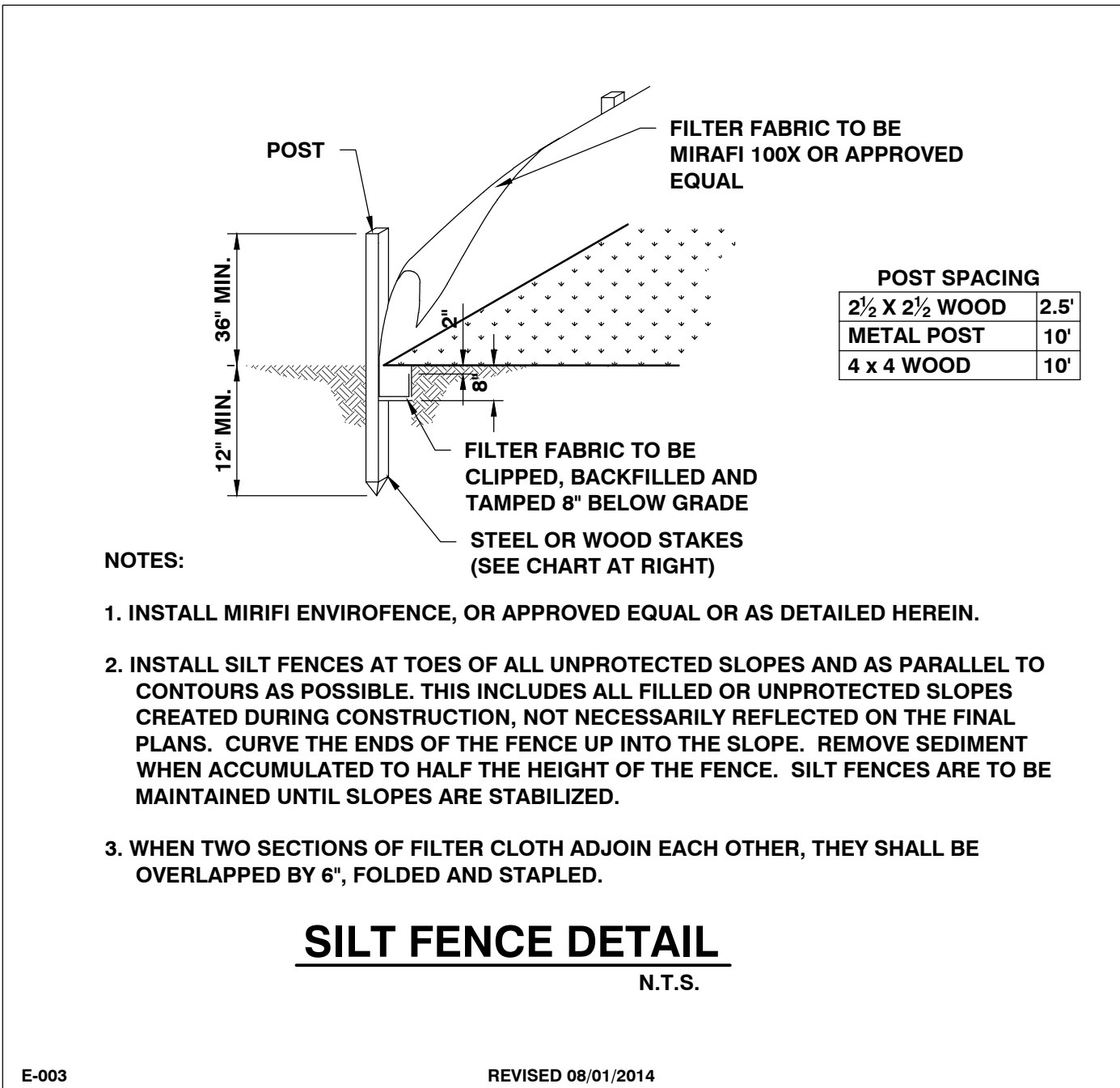
Requirements:

Inspect the site at least once every 7 days and after every rainfall or snow melt that results in a discharge from the site. Perform maintenance to ensure that practices are functioning according to the specifications outlined in this handbook.

In the event of a noticeable sediment discharge from the construction site, you must take immediate action to inspect and maintain existing erosion prevention and sediment control practices. Any visibly discolored storm water runoff to waters of the State must be reported.

Forms for reporting discharges are available at:

www.vtwaterquality.org/stormwater.htm



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PROJECT:

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HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401

DATE CHECKED REVISION

DATE	CHECKED	REVISION

**EPSC DETAILS &
SPECIFICATIONS**

DATE

JAN. 13, 2017

SCALE

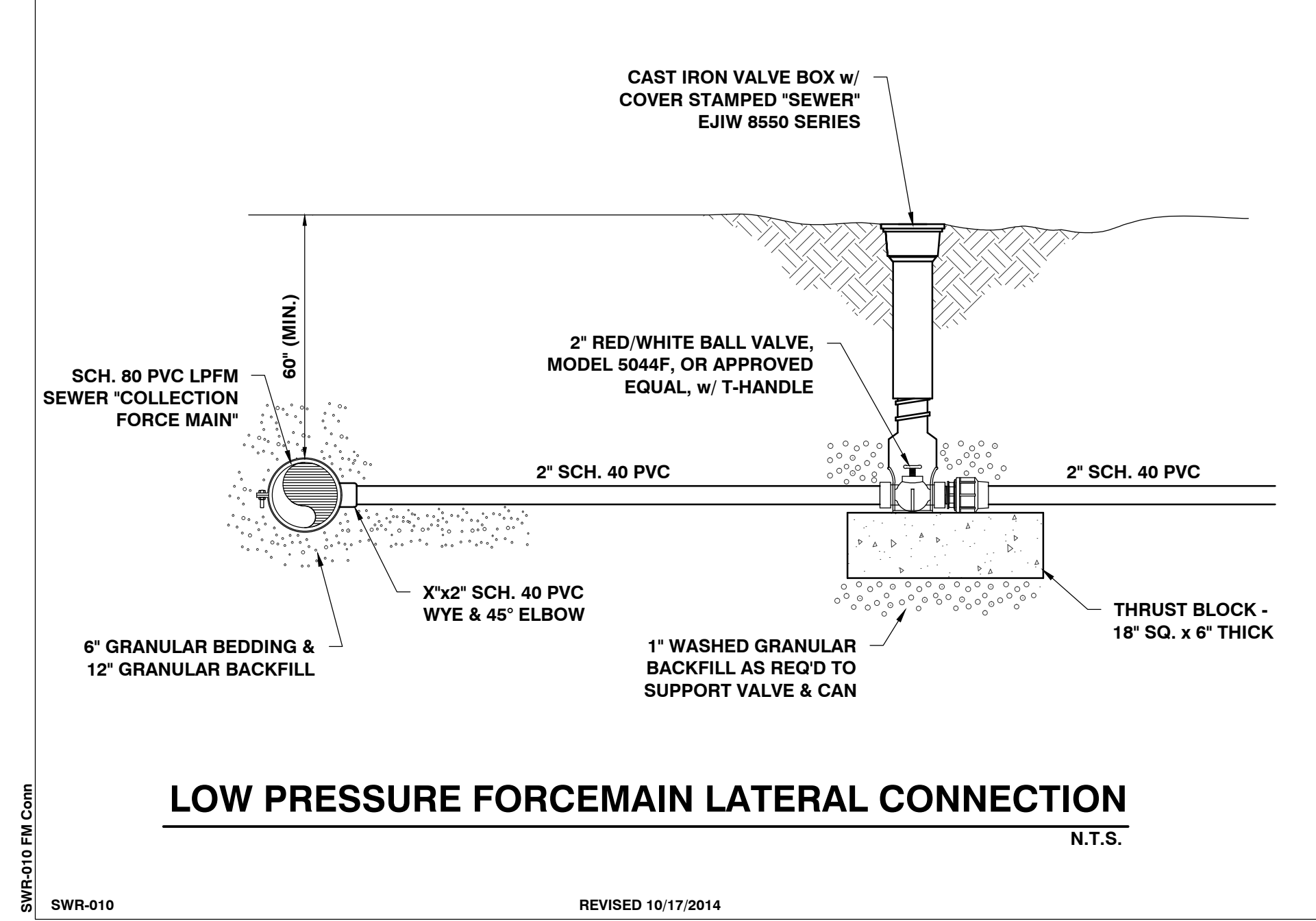
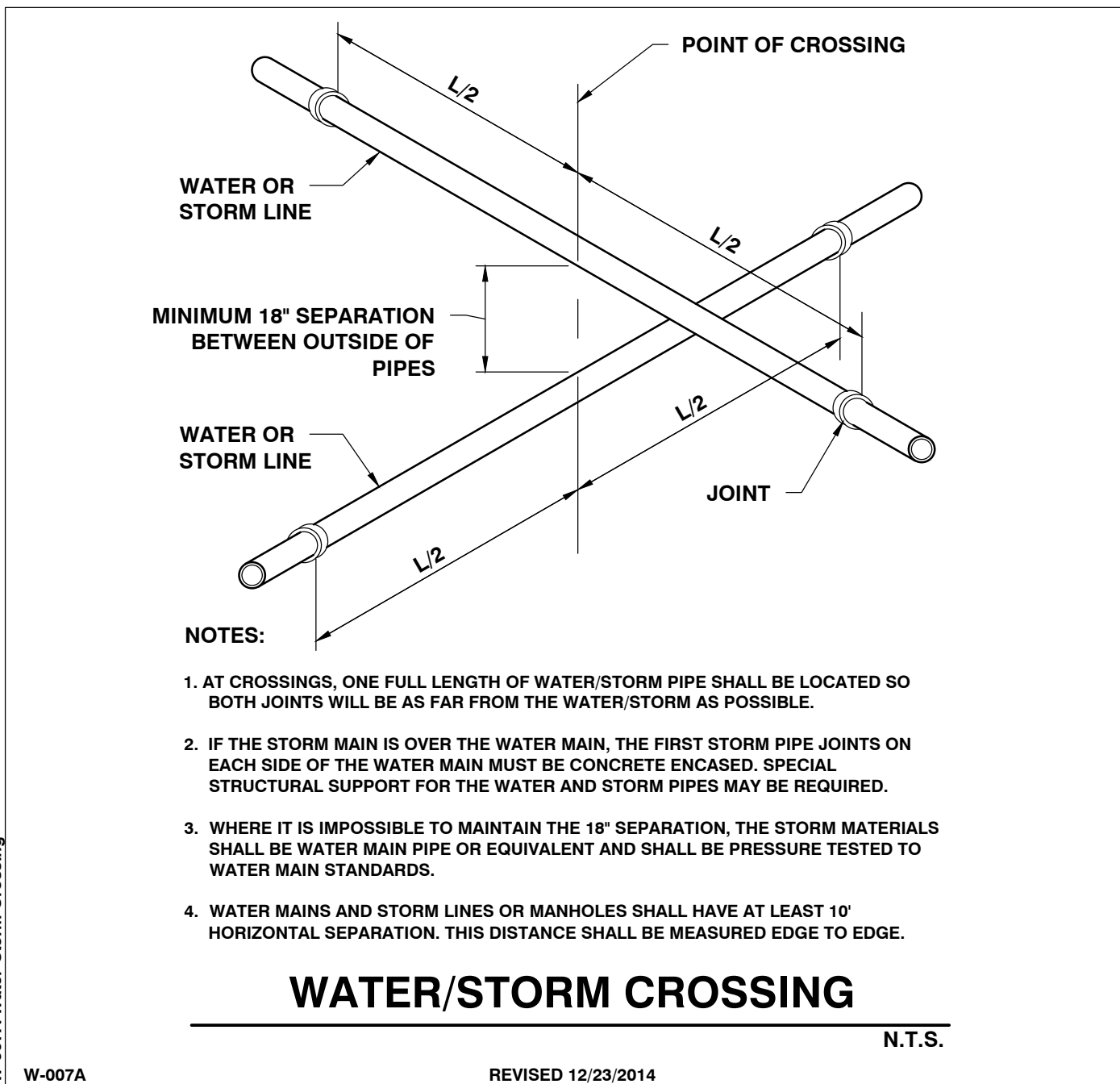
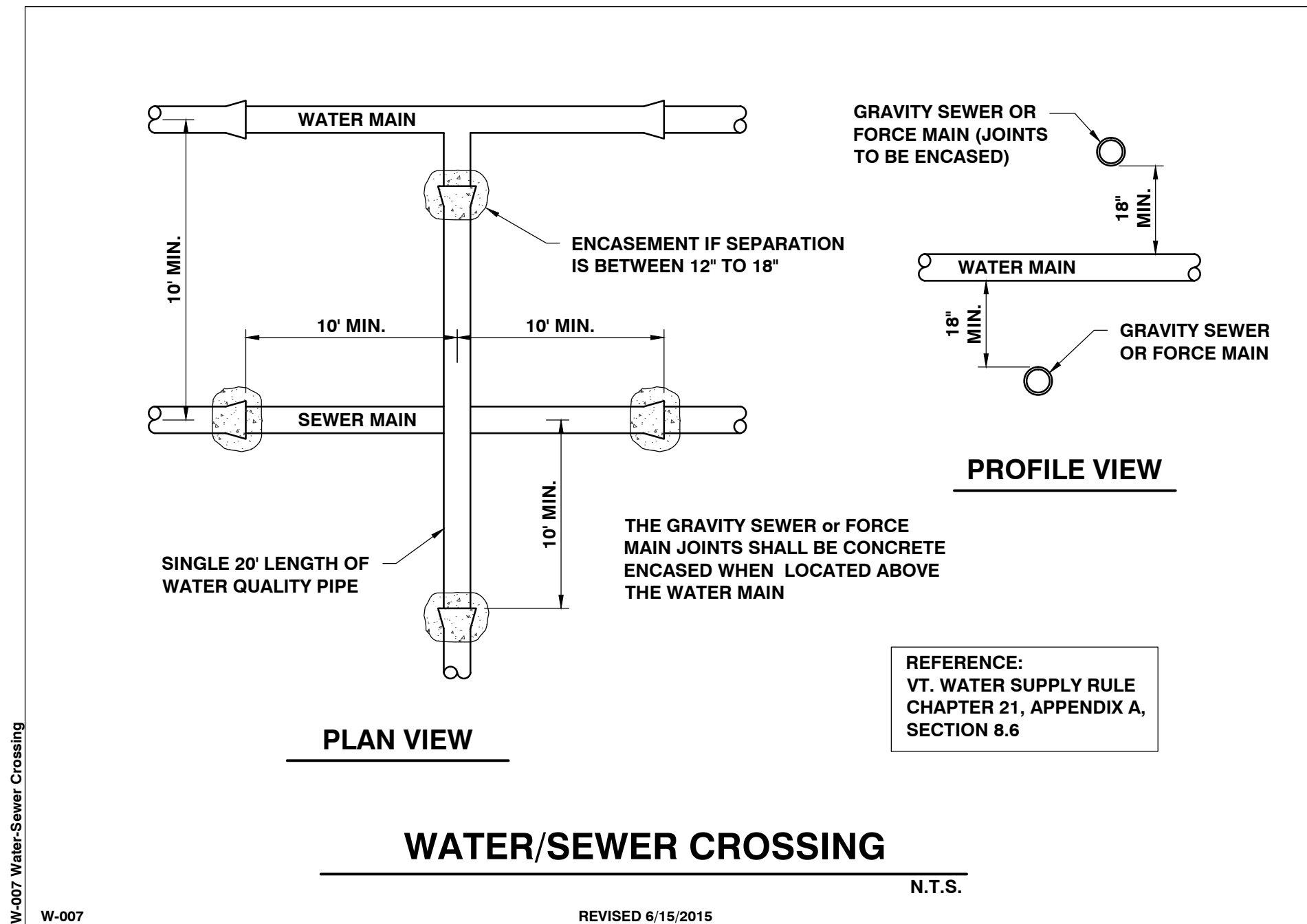
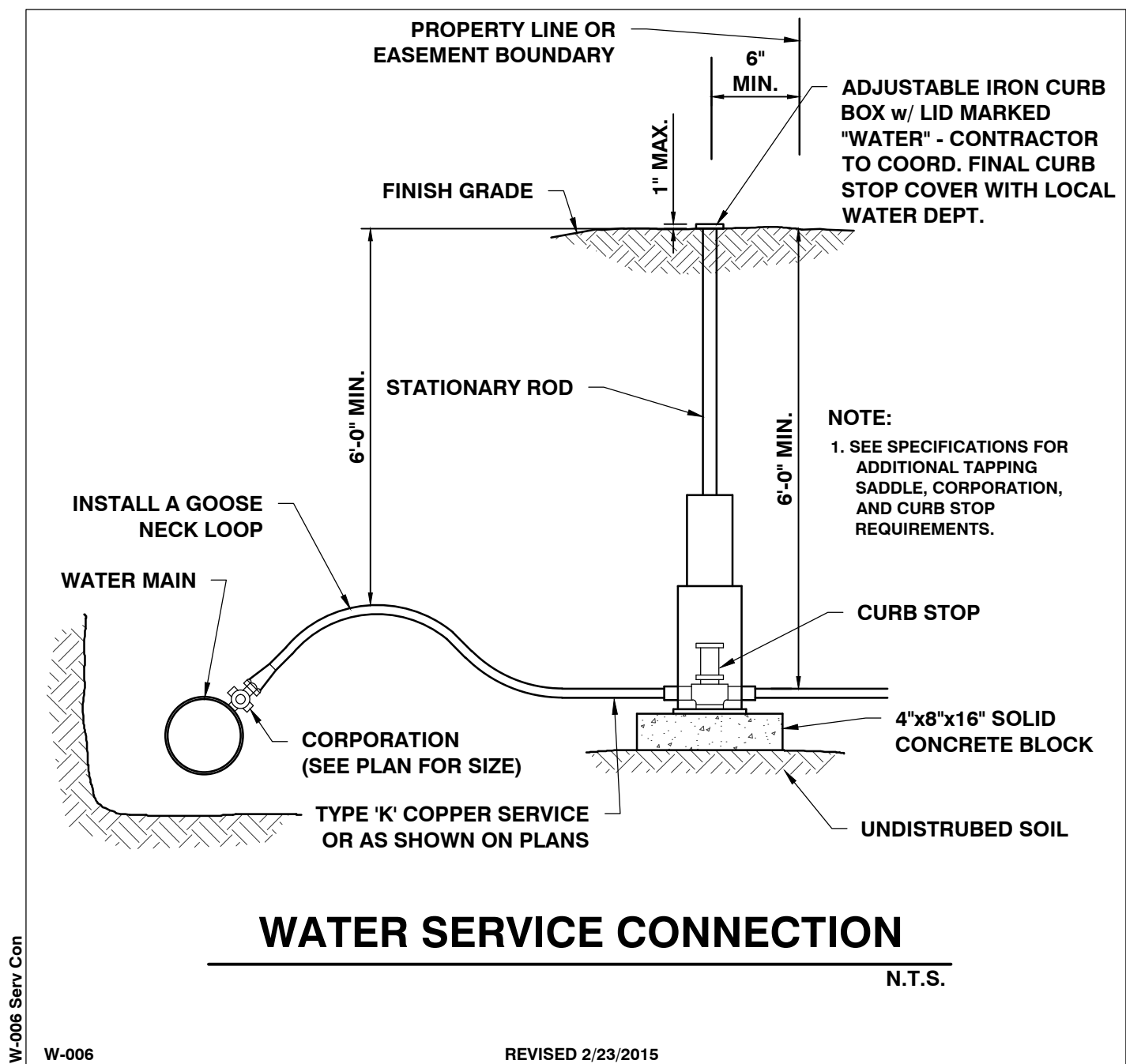
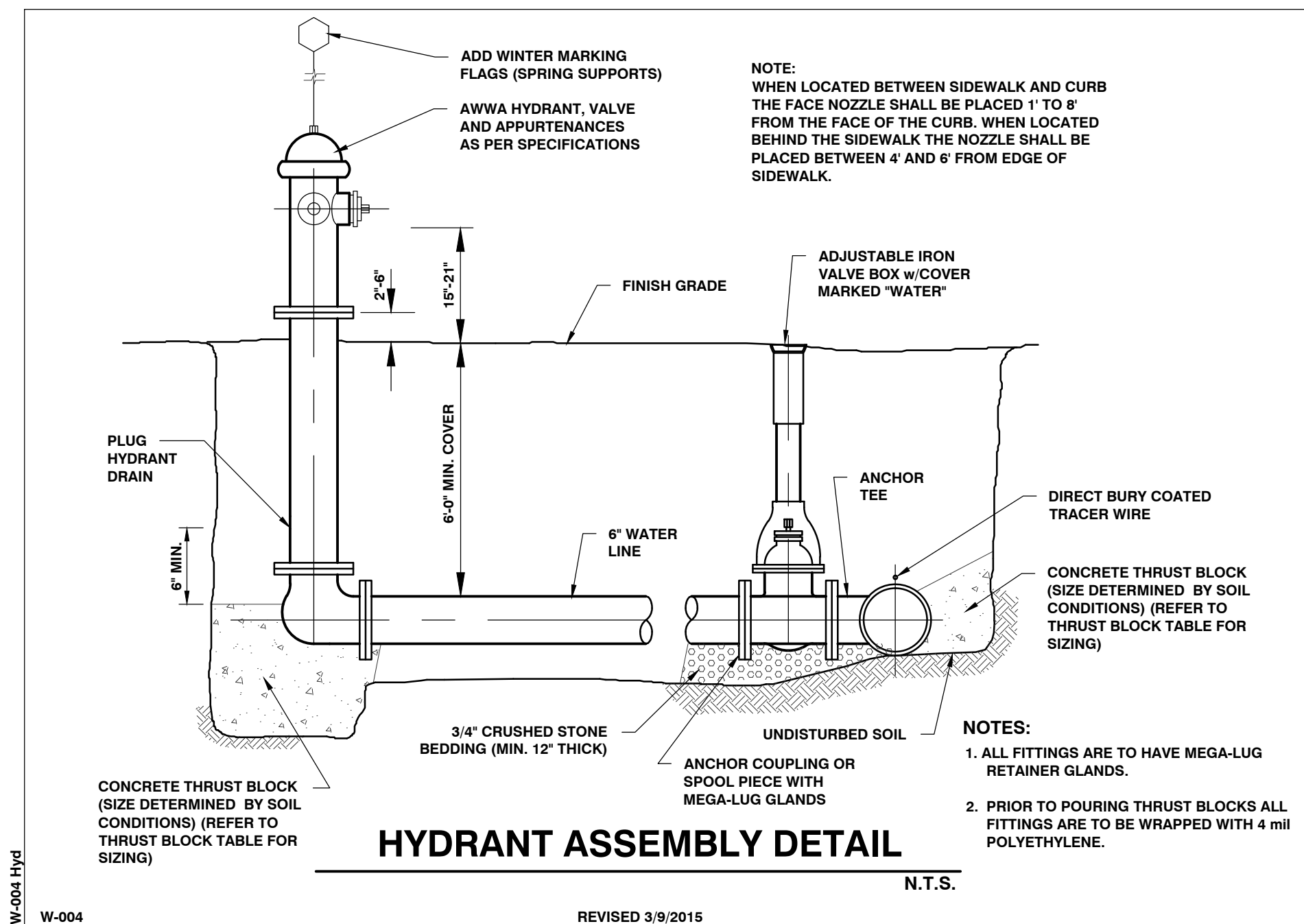
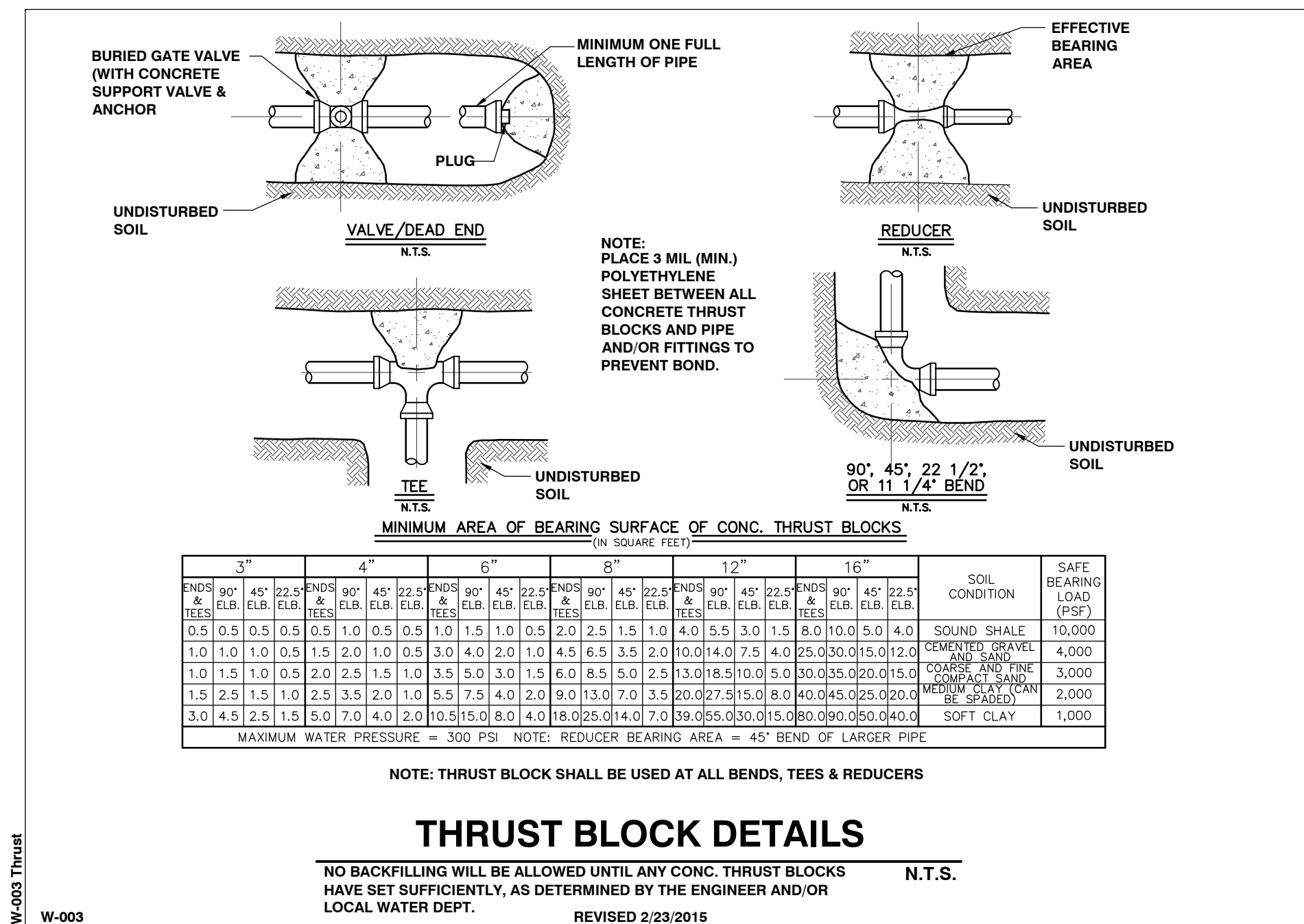
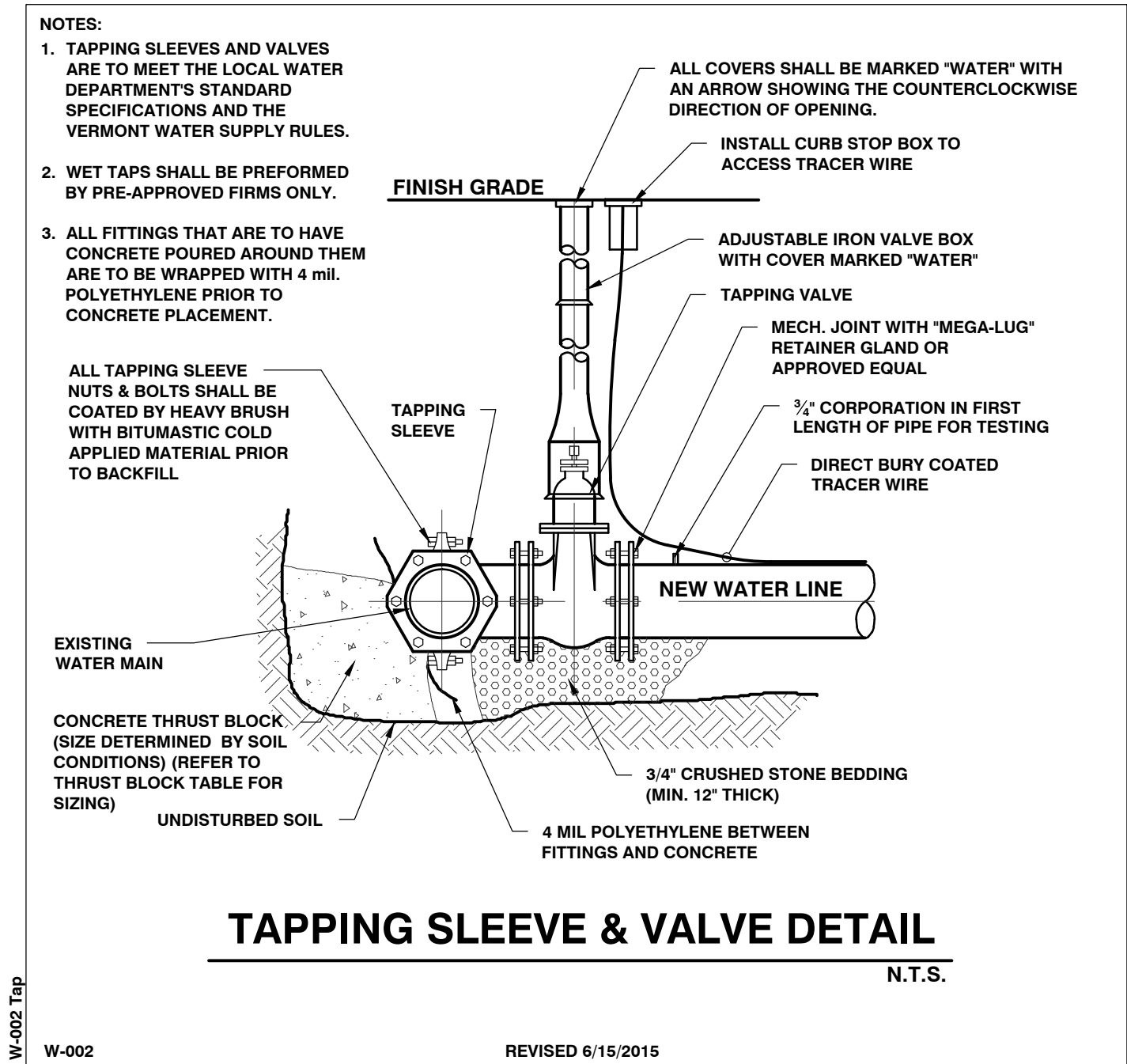
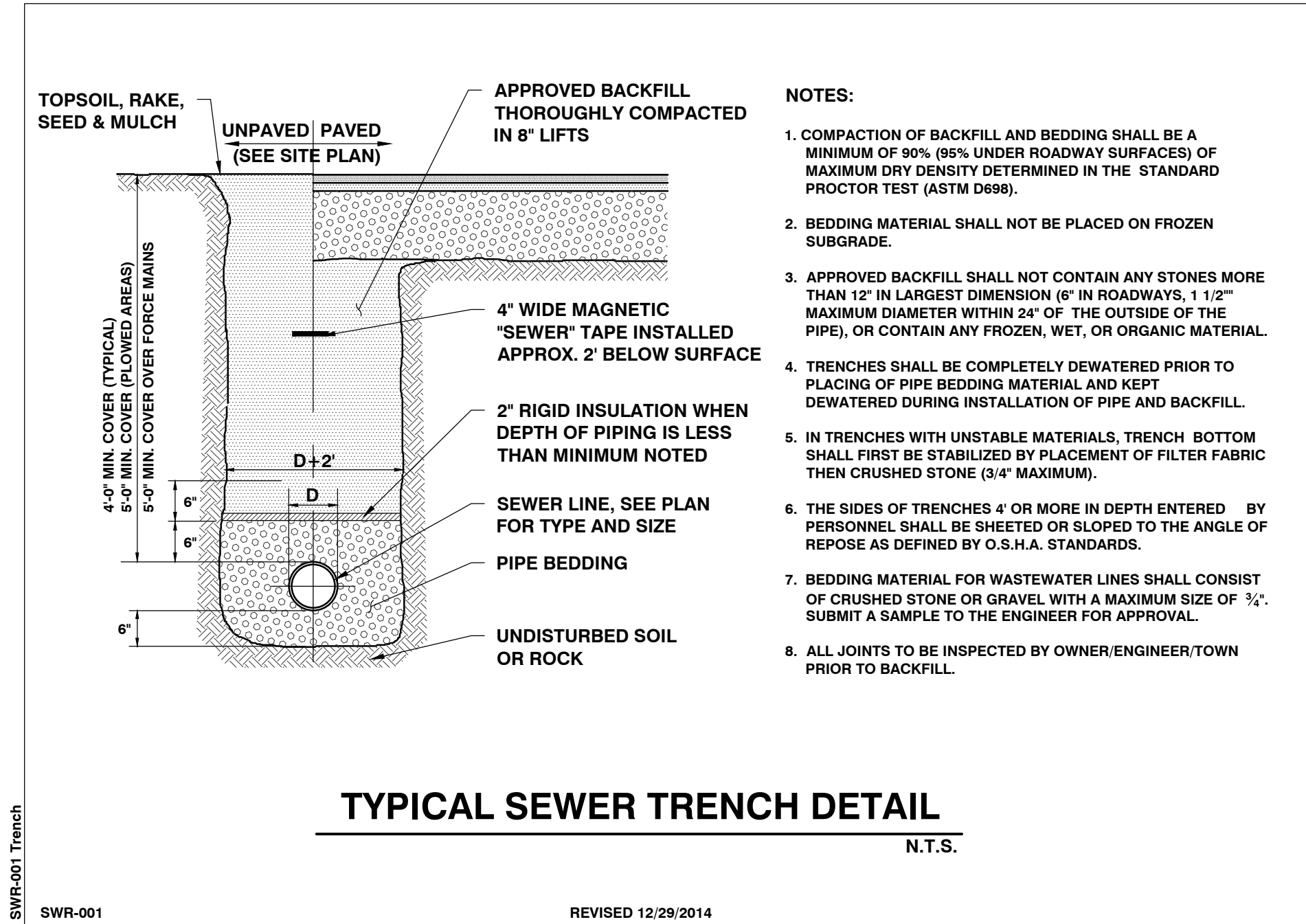
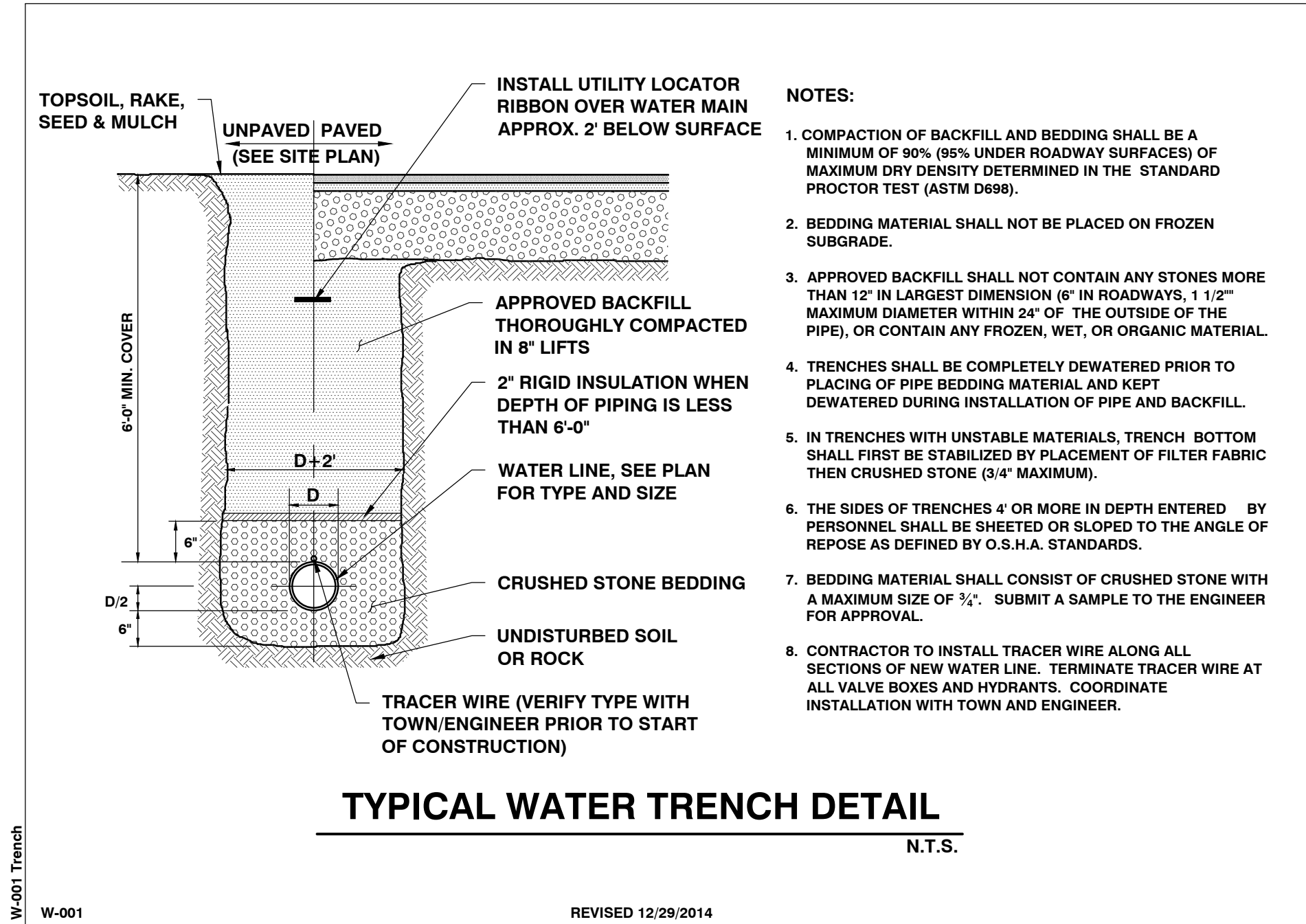
AS SHOWN

PROJ. NO.

14115

DRAWING NUMBER

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CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.ccaa-vt.com

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DRAWN
SAL

CHECKED
DSM

APPROVED
DSM

OWNER:

BURLINGTON HARBOR MARINA LLC
1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

BURLINGTON HARBOR MARINA

234 PENNY LANE
BURLINGTON VT 05401

DATE	CHECKED	REVISION

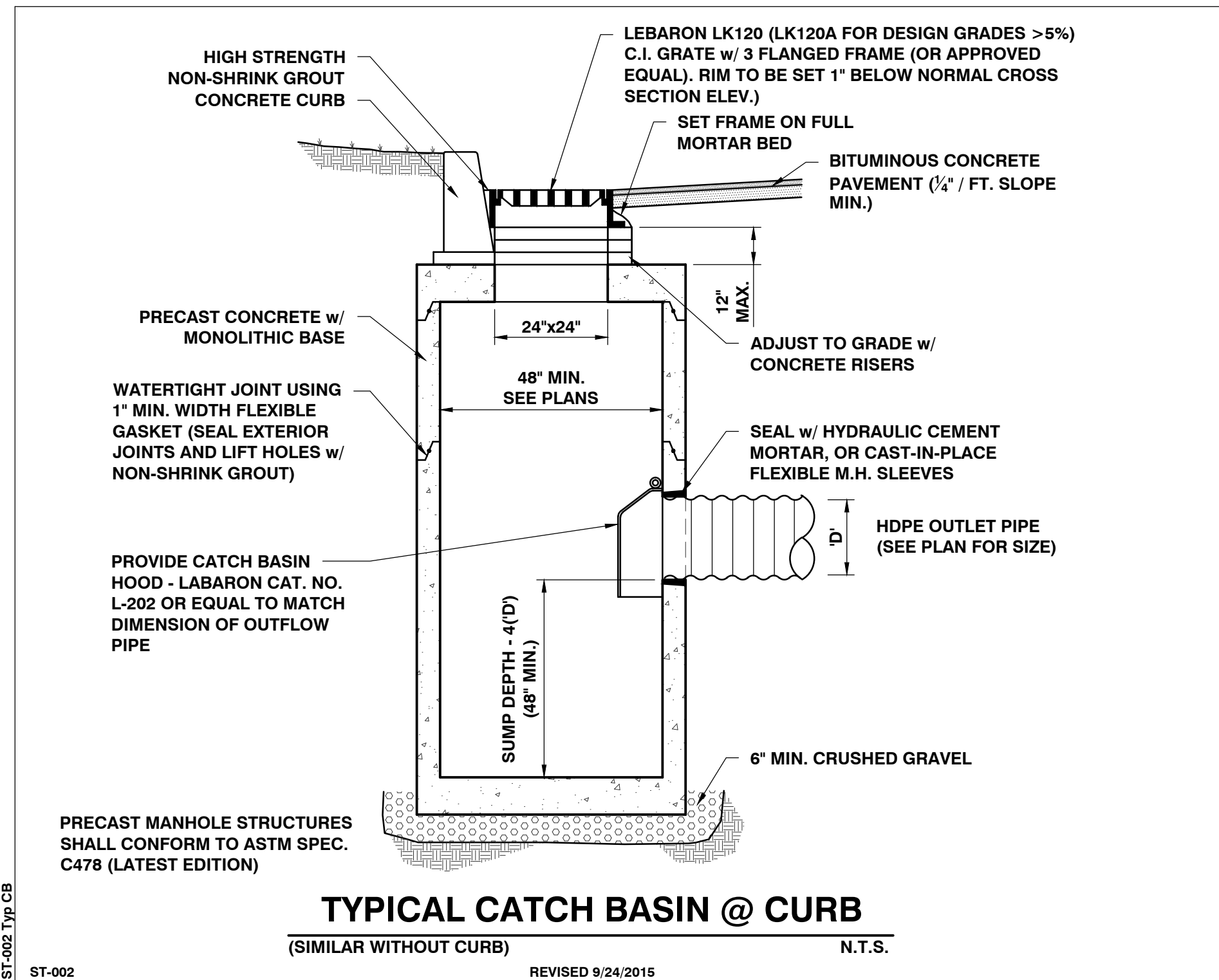
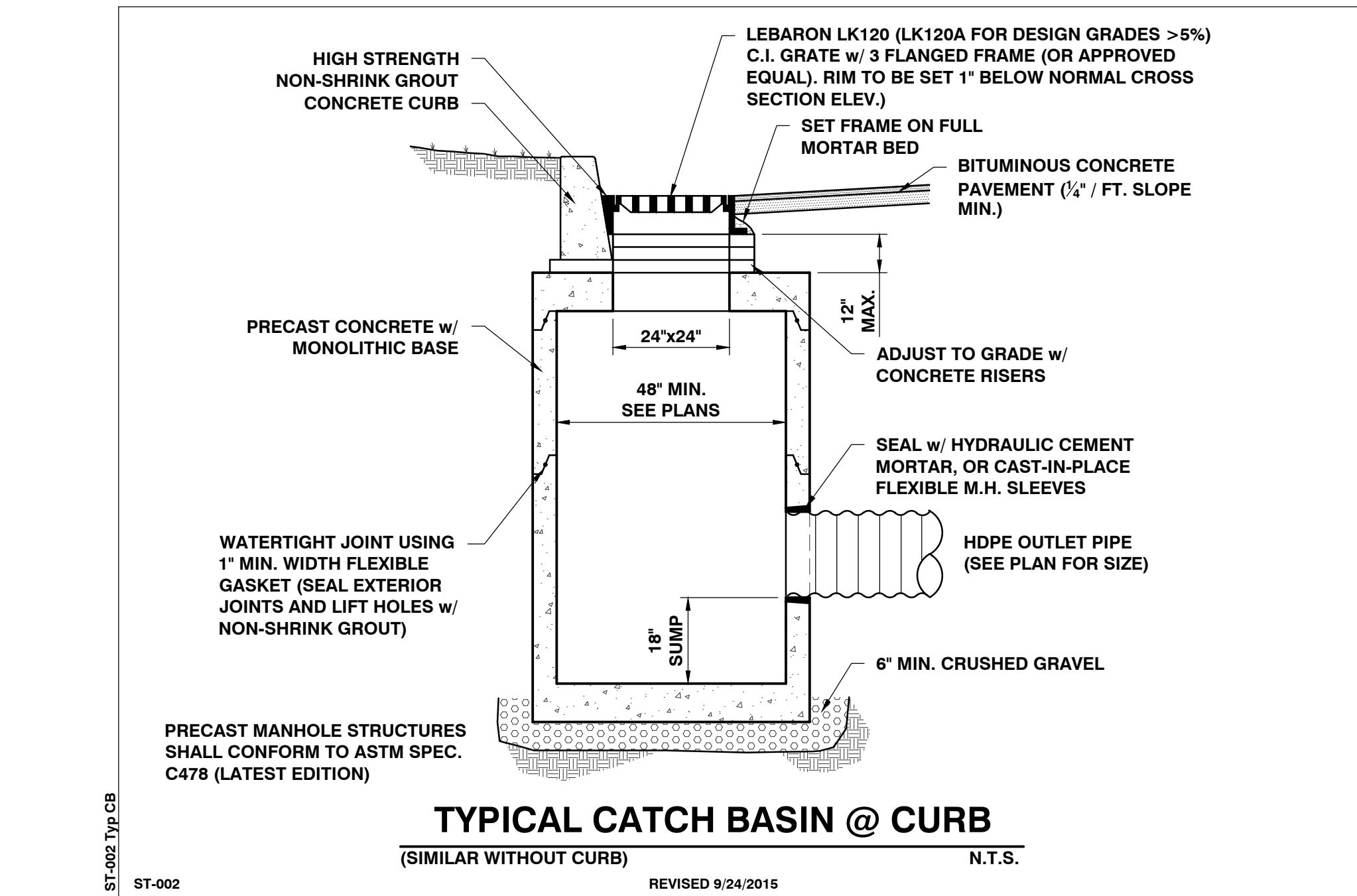
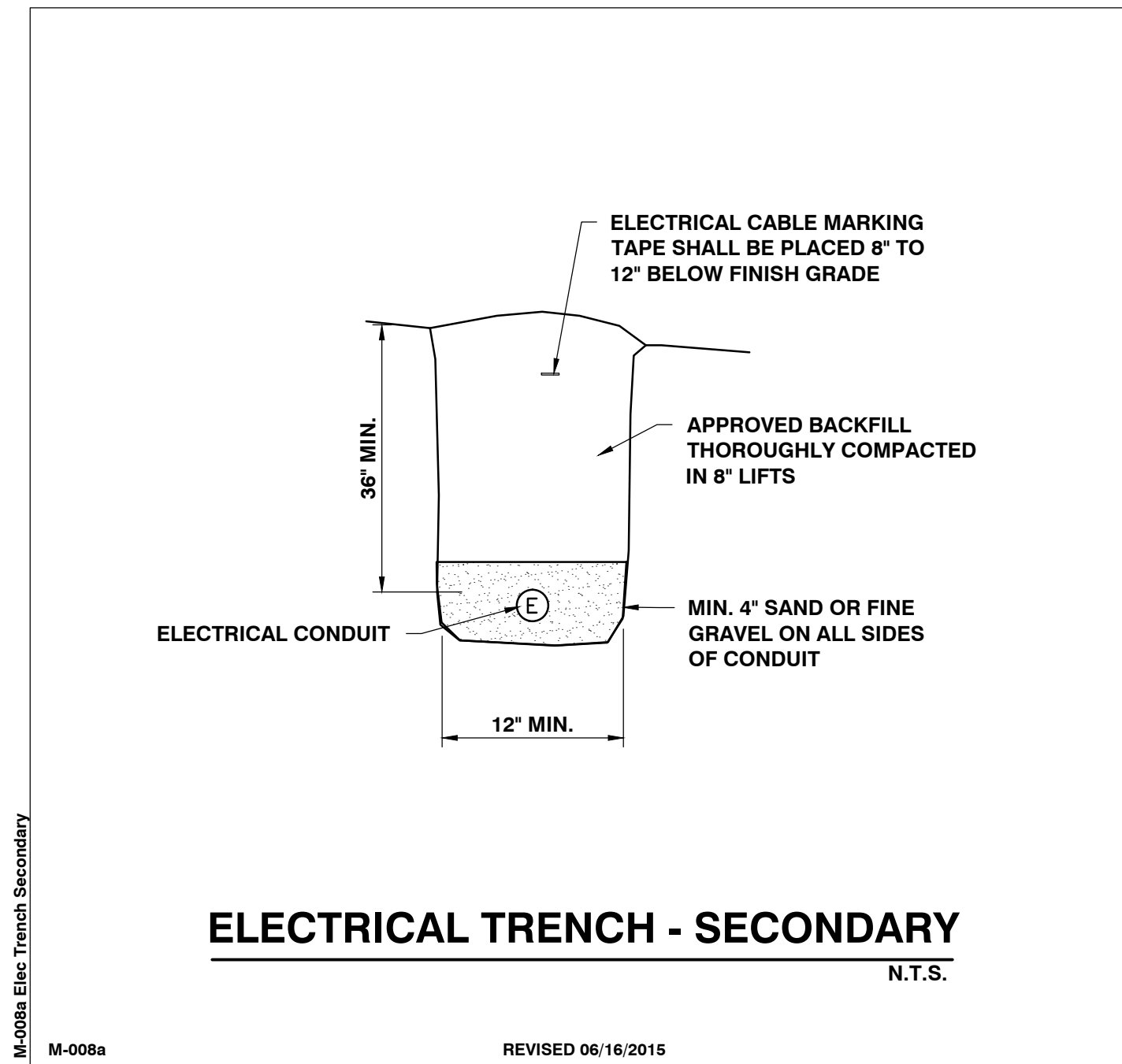
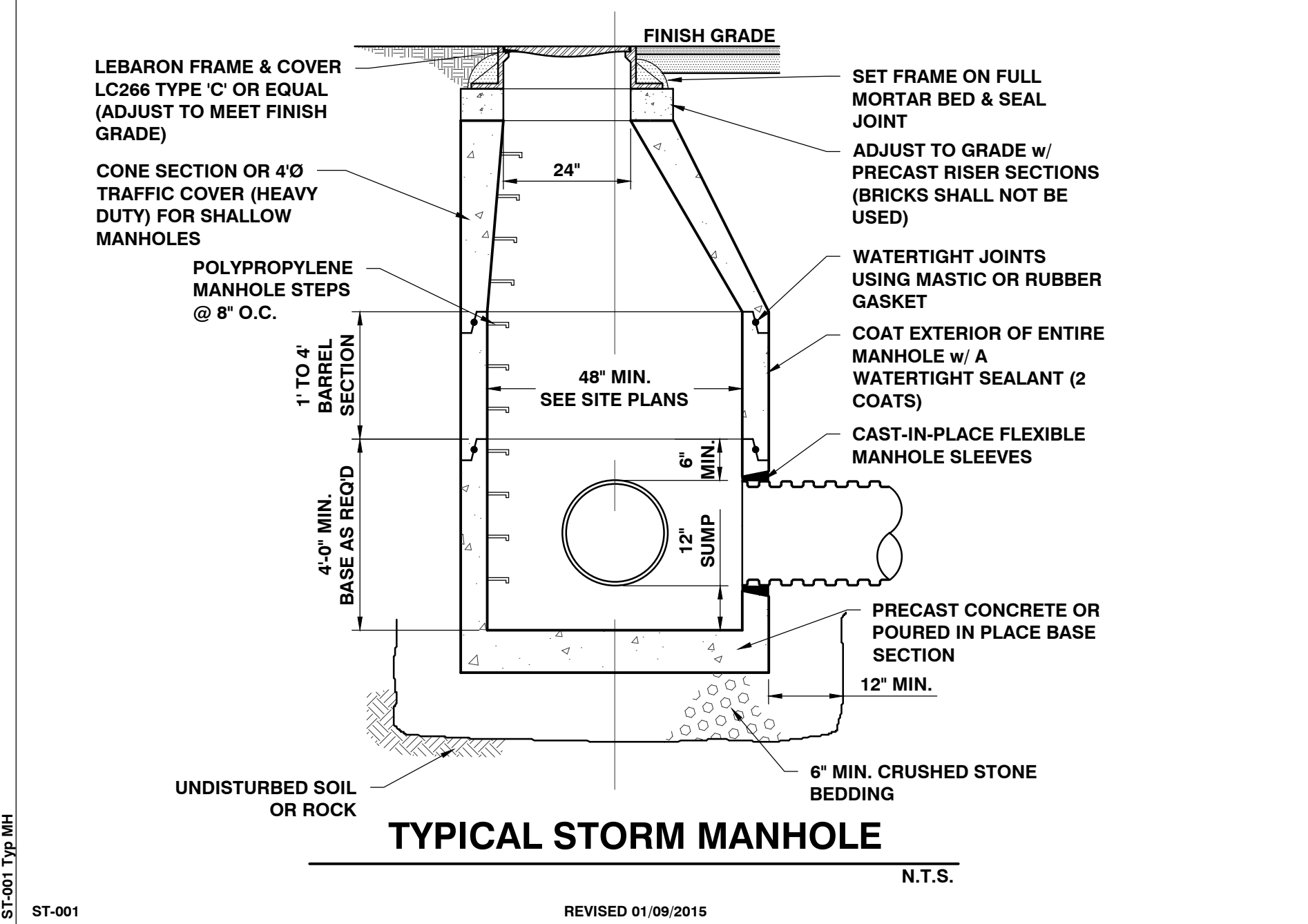
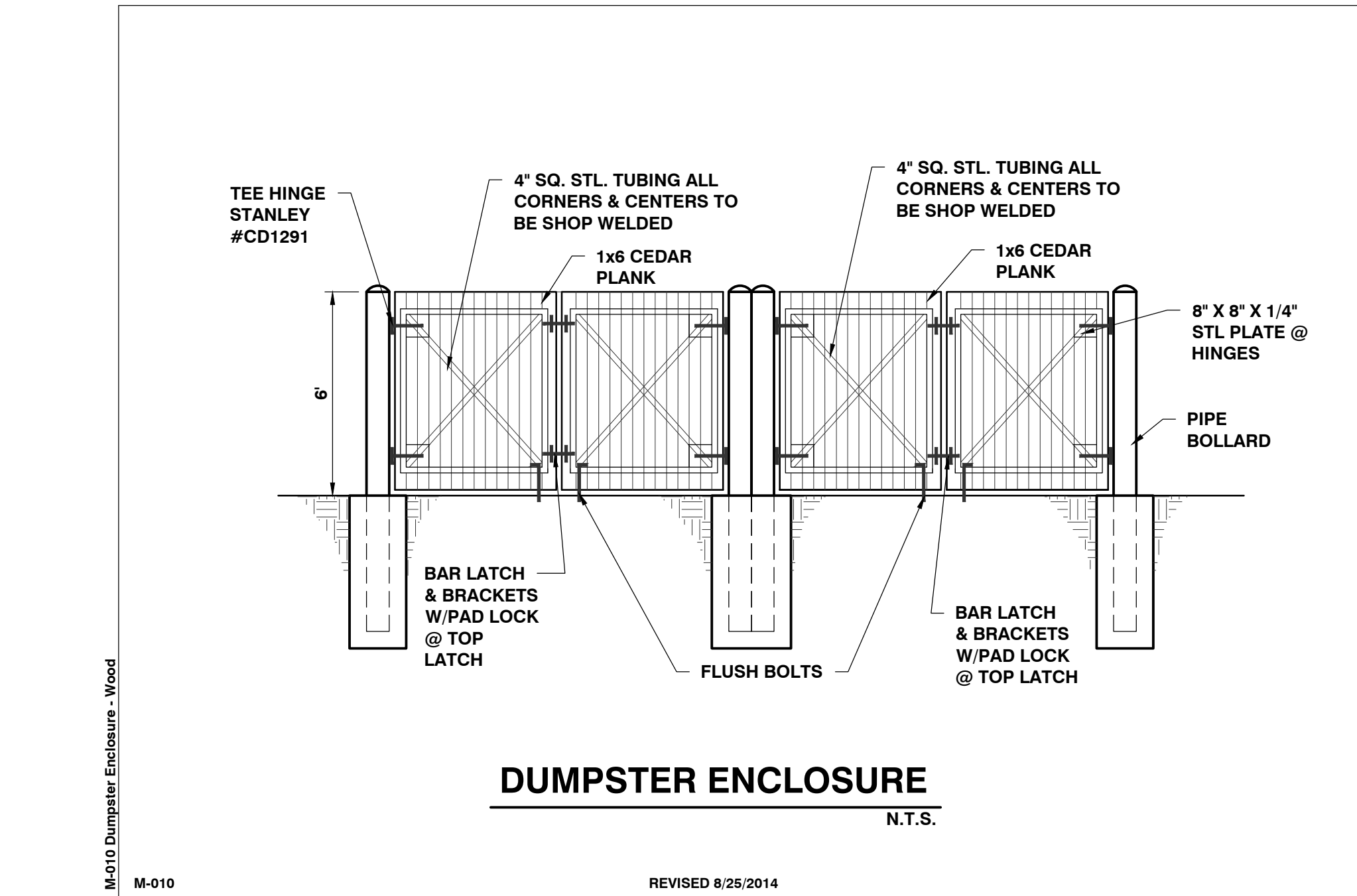
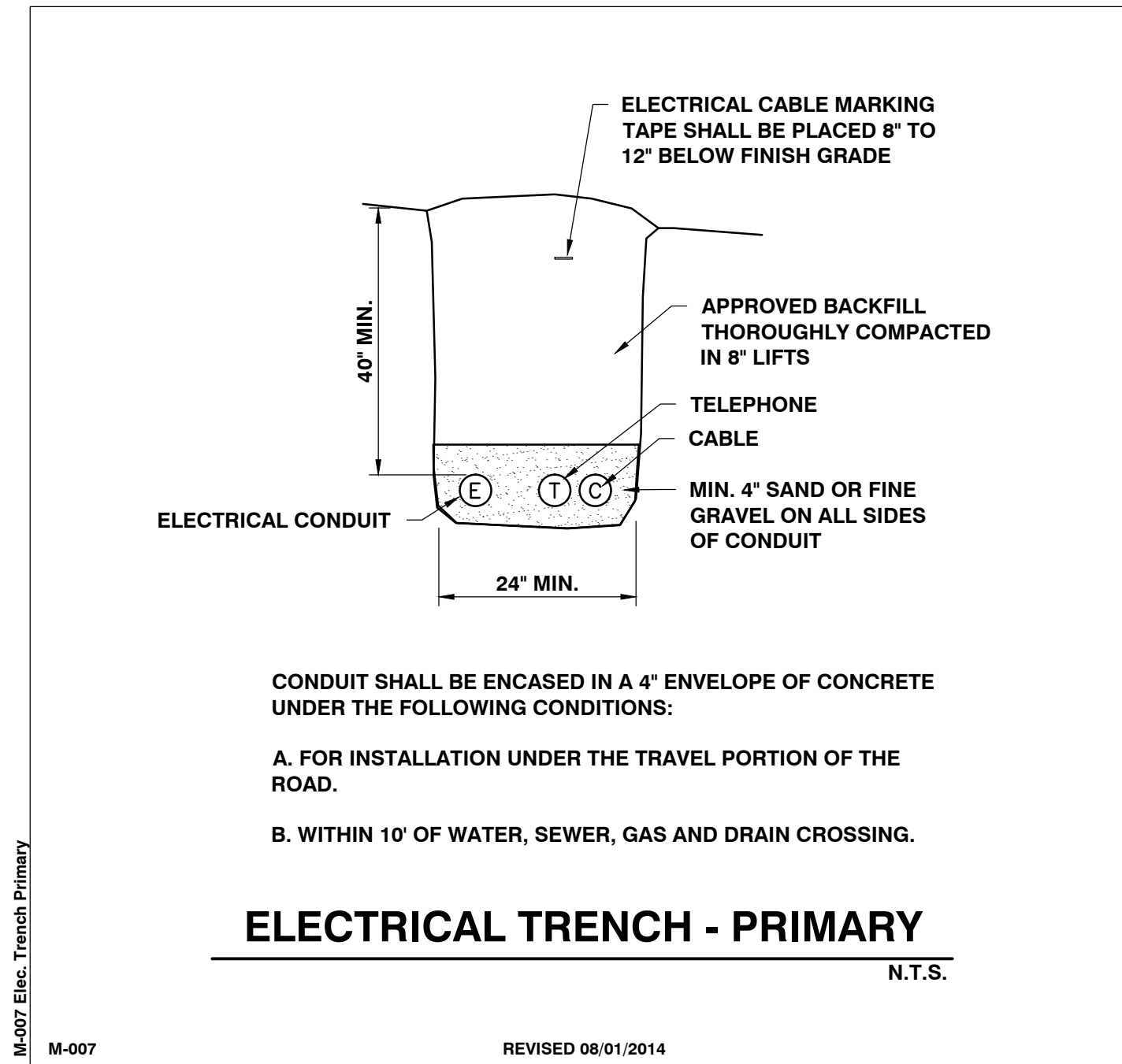
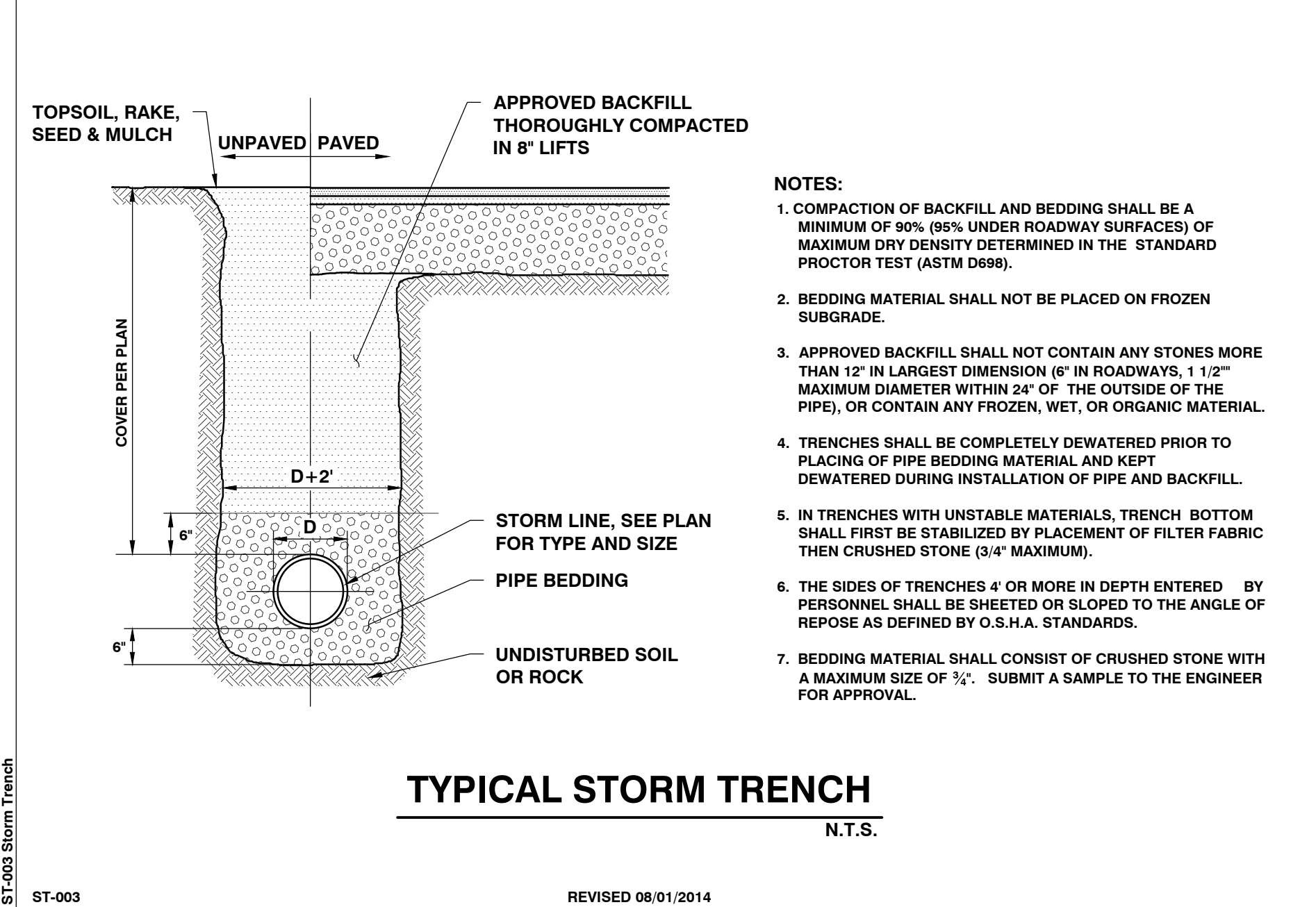
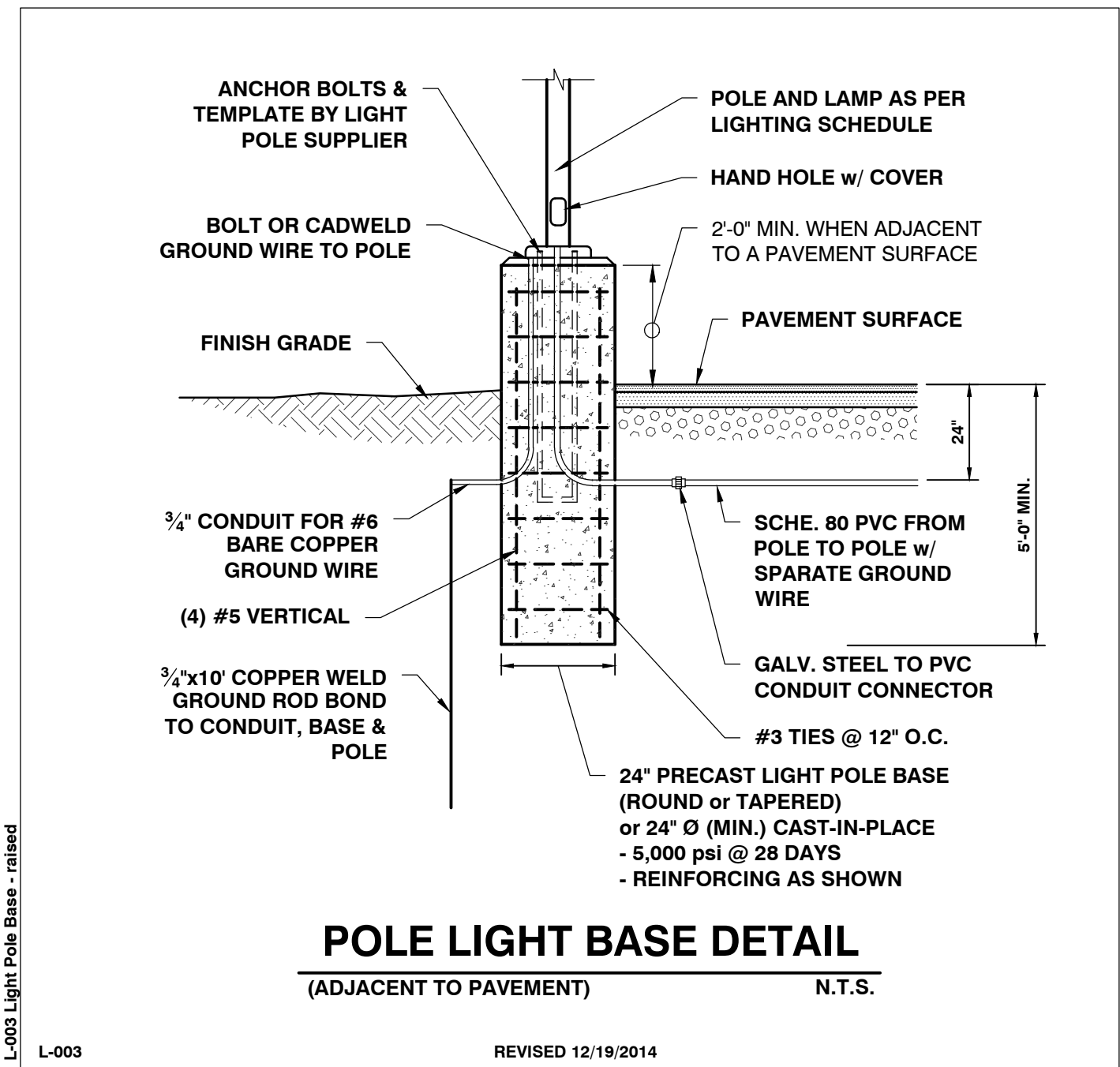
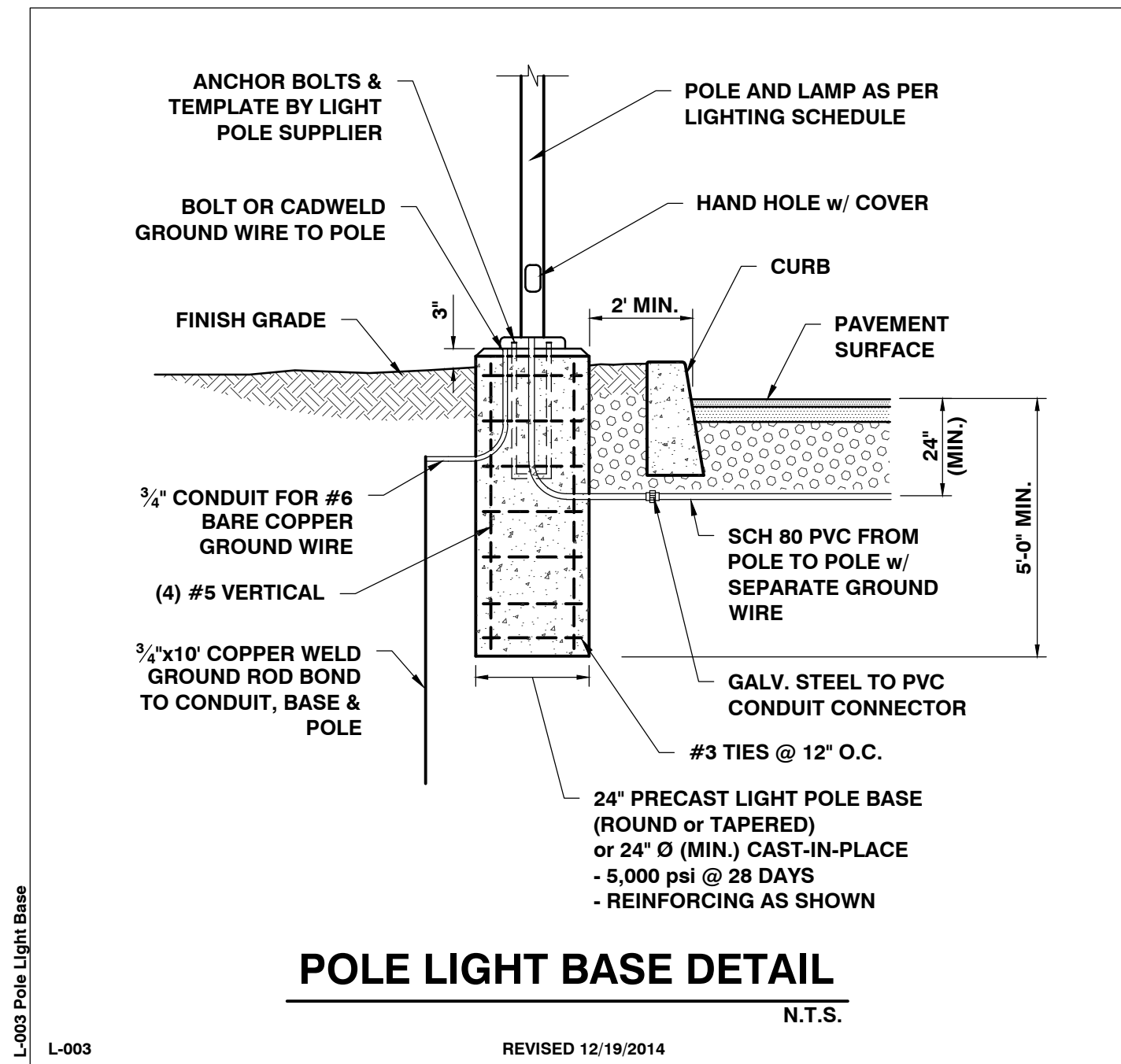
DETAILS

DATE
JAN. 13, 2017

SCALE
AS SHOWN

PROJ. NO.
14115

DRAWING NUMBER
C4.1



SITE ENGINEER:

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
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1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

BURLINGTON HARBOR MARINA

234 PENNY LANE
BURLINGTON VT 05401

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

DETAILS

DATE JAN. 13, 2017	DRAWING NUMBER C4.2
SCALE AS SHOWN	
PROJ. NO. 14115	

PROJECT COORDINATION UPDATED 8/5/16

PART 1 – GENERAL

1.01 MEETINGS & PROJECT ACCESS

- A. The Owner shall be notified five (5) days prior to commencement of Work by the Contractor.
- B. The Contractor will coordinate with the Owner to arrange an on-site pre-construction meeting prior to commencement of any work. Job superintendents and subcontractors shall be included in this meeting.
- C. The Contractor will coordinate all phases of the Work, so as not to interfere with the normal work procedures in the area.
- D. The Contractor shall conduct his work in such a manner as to not interfere with or endanger work or traffic in areas adjacent to the construction area, except as permitted by the Owner. The Contractor shall so arrange his construction operations as to provide access for emergency vehicles and equipment to the work site at all times.

1.02 LABOR

- A. The Contractor and subcontractors will employ mechanics skilled in their respective trades.
- B. All labor will be performed in a neat and workmanlike manner.

1.03 PROTECTION OF PERSONS AND PROPERTY

- A. The Contractor shall be responsible for initiating, maintaining, and supervising all O.S.H.A. safety precautions in connection with the Work.
- B. Fire Protection: The Contractor shall take all necessary precautions to prevent fires adjacent to the Work and shall provide adequate facilities for extinguishing fires. The Contractor shall also prevent fires in project related buildings and shall prevent the spread of fires to areas outside the limits of the Work.
- C. Safety Precautions: Prior to commencement of Work, the Contractor shall be familiar with all safety regulations and practices applicable with construction operations. No additional payments will be made for equipment and procedures necessitated by these safety precautions.

1.04 CORRECTION OF WORK

- A. The Contractor shall promptly correct all Work rejected by the Owner as defective or as failing to conform to the Contract Documents. The Contractor shall bear all cost of correcting such rejected Work.

1.05 WEATHER CONDITIONS

- A. No Work shall be done when, in the opinion of the Owner, the weather is unsuitable. No concrete, earth backfill, embankment, or paving shall be placed upon frozen material. If there is delay or interruption in the Work due to weather conditions, the necessary precautions must be taken to bond new Work to old.
- B. Protection Against Water and Storm: The Contractor shall take all precautions to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor, at his own expense, shall make repairs or replacements or rebuild such parts of the Work as the Engineer may require in order that the finished work may be completed as required by the Drawings and Specifications.

1.06 DISPOSAL OF DEBRIS

- A. All debris and excess materials, other than that which is authorized to be reused, become the property of the Contractor and shall be promptly removed from the property. The Contractor shall receive title to all debris and/or excess material. The Owner will not be responsible for any loss or damage to debris or excess material owned by the Contractor.

1.07 PROJECT LAYOUT

- A. The Contractor shall be responsible for providing all necessary survey staking.
1. Locate and protect control points before starting work on the site.
2. Preserve permanent reference points during progress of the Work.
3. Establish a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
- a. Record locations, with horizontal and vertical data, on Project Record Documents.

1.08 TESTING

- A. The Contractor is responsible for obtaining testing and inspection services.

SITE CLEARING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:

1. Remove surface debris.
2. Clear site of plant life and grass.
3. Remove trees and shrubs.
4. Remove root system of trees and shrubs.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 PROTECTION

- A. Protect utilities that remain from damage.
- B. Protect trees, plant growth, and features designated to remain as final landscaping.
- C. Protect bench marks and existing structures from damage or displacement.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- E. Maintain access to the site at all times.

3.02 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees and shrubs within marked areas. Remove stumps, roots and tap roots and other projections 14" or greater in diameter to 2'-0" below the excavated surfaces in cut areas and 2'-0" below the exposed subgrade in fill areas.

3.03 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. The Contractor shall coordinate Work with the Engineer and Owner in establishing suitable areas within the property limits for depositing debris, rocks and extracted plant life. The Contractor shall be responsible for backfilling (capping) and grading all waste sites.

3.04 UTILITIES

- A. Coordinate with utility companies and agencies as required.

SITE EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
1. All excavation (unless covered in other sections of these specifications), removal and stockpile of topsoil, stabilization fabric, and other miscellaneous and appurtenant works.
2. Site filling.
3. Roadway structural sections.

1.02 PROTECTION

- A. Protect bench marks and existing structures.
- B. Protect above or below grade utilities which are to remain.

1.03 SUBMITTALS

- A. Testing laboratory reports indicating that material for backfill meets requirements of this Section.
- B. Field density test reports of site fill in place.
- C. Field density test reports for roadway structural sections in place.
- D. Stabilization Fabric: Submit copies of manufacturer's specifications and installation instructions.

PART 2 – PRODUCTS – For permeable pavement areas see sheets C6.0 & C6.1

2.01 STRUCTURAL FILL – CRUSHED GRAVEL (AOT SPEC. 704.05, FINE)

- A. All materials shall be secured from approved sources. This gravel shall consist of angular and round fragments of hard durable rock of uniform quality throughout, reasonably free from thin elongated pieces, soft or disintegrated stone, dirt, organic or other objectionable matter. This material shall meet the following grading requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
2"	100
1 1/2"	90 – 100
No. 4	30 – 60
No. 100	0 – 12
No. 200	0 – 6

2.02 CRUSHED GRAVEL (AOT SPEC. 704.05, COARSE)

- A. This material shall meet the following grading requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
4"	95 – 100
No. 4	25 – 50
No. 100	0 – 12
No. 200	0 – 6

At least 50% by mass (weight) of the material coarser than the No. 4 sieve shall have at least one fractured face.

2.03 COMPACTED FILL/GRANULAR BORROW

- A. This material shall be free of shale, clay, friable material, debris, and organic matter, graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
3"	100
¾"	75 – 100
No. 4	20 – 100
No. 100	0 – 20
No. 200	0 – 6

2.04 DRAINAGE COURSE (AOT SPEC. 704.16)

- A. Rock for drainage applications shall be produced from natural gravels or crushed quarried rock and shall consist of clean, hard, sound, and durable material. It shall be obtained from

approved sources and shall meet the following grading requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1"	100
¾"	90 – 100
¾"	20 – 55
No. 4	0 – 10
No. 8	0 – 10

2.5. DENSE GRADED CRUSHED STONE

- A. Dense Graded Crushed Stone should consist of a well graded crushed run stone and should meet the requirements for Vermont AOT Standard Specifications Item 704.06 Dense Graded Crushed Stone for Subbase and the gradation requirements shown in Table 704.06A of the Vermont AOT Standard Specifications.

Sieve Designation	Percent Finer by Weight
3½"	100
3"	90 – 100
2"	75 – 100
1"	50 – 80
½"	30 – 60
No. 4	15 – 40
No. 200	0 – 6

2.1. RECYCLED ASPHALT PAVEMENT (RAP) 1½" MINUS CRUSHED ASPHALT

- A. This material shall be free of Portland Cement and approved by the engineer prior to installation. This material shall not be mixed with gravel and shall meet the following grading requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
2"	100
1½"	90 – 100
No. 4	30 – 60
No. 100	0 – 12
No. 200	0 – 6

2.6 SAND BORROW AND CUSHION

- A. Sand Borrow shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and shall meet the requirements for Vermont AOT Standard Specifications and the gradation requirements shown in Table 703.03A of the Vermont AOT Standard Specifications.

Sieve Designation	Percent Finer by Weight
2"	100
1½"	90 – 100
½"	70 – 100
No. 4	60 – 100
No. 100	0 – 20
No. 200	0 – 8

2.07 GEOTEXTILE

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 3; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 3; AASHTO M 288.
2. Grab Tensile Strength: 200 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 75 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
9. Weight: 4.0 oz/yd² minimum.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify known below grade utilities. Stake and flag locations.
- C. Maintain and protect existing utilities remaining which pass through work area.

- D. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

3.02 EROSION CONTROL

- A. Erosion control must be installed prior to beginning any earthwork operations.

3.03 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be excavated, re-landscaped or regraded and stockpile in areas designated on site or as directed by the Engineer.

- B. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.

1. Maintain stockpile free from debris and trash.
2. Keep the topsoil damp to prevent dust and drying out.

3.04 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be regraded in accordance with plans.
- B. Excavate subsoil required to accommodate site structures, construction operations, roads, and parking areas.
- C. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- D. Notify engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- E. Correct areas over-excavated by error as directed by the Engineer.

3.05 DITCHES

- A. Cut accurately to the cross-sections, grades, and elevations shown.
- B. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the work.
- C. Dispose of excavated materials as shown on the drawings or directed by the Engineer; except do not, in any case, deposit materials less than three feet from the edge of a ditch.

3.06 ROADWAY EMBANKMENTS AND BERMS

- A. When embankments are to be made on a hillside, the slope of the original ground on which the embankments are to be constructed shall be stepped and properly drained as the fill is constructed so that adverse movements of the slopes do not occur.
- B. Any excavated rock, ledge, boulders, and stone, except where required in the construction of other items or otherwise directed, shall be used in the construction of embankments to the extent of the project requirements and generally shall be placed so as to form the base of an embankment.
- C. Frozen material shall not be used in the construction of embankments, nor shall the embankments or successive layers of the embankments be placed upon frozen material. Placement of material other than rock shall stop when the sustained air temperature, below 32 degrees Fahrenheit, prohibits the obtaining of the required compaction. If the material is otherwise acceptable, it shall be stockpiled and reserved for future use when its condition is acceptable for use in embankments.
- D. When an embankment is to be constructed across a swamp, muck, or areas of unstable soils, the unsuitable material shall be excavated to reach soils of adequate bearing capacity and the embankment begun. Alternative methods, such as use of a stabilization fabric in place of excavation and backfill, may be utilized only after approval of same by the Engineer.

- E. Material being placed in embankments shall be placed in horizontal layers of uniform thickness across the full width of the embankment. Stumps, trees, rubbish, and other unsuitable material shall not be placed in embankments.

- F. Embankment areas shall be placed in eight-inch maximum lifts. Effortless spreading equipment shall be used on each layer to obtain uniform thickness prior to compaction. Each layer shall be kept crowned to shed water to the outside edge of embankment and continuous leveling and manipulating will be required to assure uniform density. The entire area of each layer shall be uniformly compacted to at least the required minimum density by use of compaction equipment consisting of rollers, compactors, or a combination thereof. Earth-moving and other equipment not specifically manufactured for compaction purposes will not be considered as compaction equipment.

- G. All fill material shall be compacted at a moisture content suitable for obtaining the required density. In no case shall the moisture content in each layer under construction be more than three percent above the optimum moisture content and shall be less than that quantity that will cause the embankment to become unstable during compaction. Sponginess, shoving, or other displacement under heavy equipment shall be considered evidence for an engineering determination of lack of stability under this requirement, and further placement of material in the area affected shall be stopped or retarded to allow the material to stabilize.

- H. When the moisture content of the material in the layer under construction is less than the amount necessary to obtain satisfactory compaction by mechanical compaction methods, water shall be added by pressure distributors or other approved equipment. Water may also be added in excavation or borrow pits. The water shall be uniformly and thoroughly incorporated into the soil by disc, harrowing, blading, or by other approved methods. This manipulation may be omitted for sands and gravel. When the moisture content of the material is in excess of three percent above optimum moisture content, dry material shall be thoroughly incorporated into the wet material, or the wet material shall be aerated by disk, harrowing, blading, rotary mixing, or by other approved methods; or compaction of the layer of wet material shall be deferred until the layer has dried to the required moisture content by evaporation.

3.07 COMPACTION REQUIREMENTS

- A. All backfills and fills shall be compacted in even lifts (12" maximum) to attain the required densities as follows:

Location	Modified Proctor ASTM D-1557
Subgrade (8") and Gravel for Roads and Parking Lots	95%
General Embankments	90%

UTILITY TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
1. Trench, backfill, and compact as specified herein and as needed for installation of underground utilities.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. Comply with all requirements of governmental agencies having jurisdiction.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

- A. Fill and backfill materials:
1. Provide backfill materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension.
2. Fill material is subject to the approval of the Engineer, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soil free from roots and other deleterious matter.
3. Do not permit rocks having a dimension greater than 2" within 2' of the outside of pipe.
4. Cohesionless material used for backfill: Provide sand free from organic material and other foreign matter, and as approved by the Engineer.

PART 3 – EXECUTION

3.01 PROCEDURES

- A. Existing Utilities:
1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
2. When existing underground utilities, which are not scheduled for removal or abandonment, are encountered in the excavation, they shall be adequately supported and protected from damage. Any damage to utilities shall be repaired promptly at no additional cost to the Owner.
3. If the service is interrupted as a result of work under this section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

- B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this section.
- C. Dewatering: The Contractor, at all times, shall conduct his operations so as to prevent the accumulation of water, ice, and snow in excavations or in the vicinity of excavated areas, and to prevent water from interfering with the progress of quality of the work. Under no conditions shall water be allowed to rise in open trenches after pipe has been placed.
- D. Accumulated water, ice, and snow shall be promptly removed and disposed of by pumping or other approved means. Disposal shall be carried out in a manner which will not create a hazard to public health, nor cause injury to public or private property, work completed or in progress, or public streets, nor cause any interference in the use of streets and road by the public. Pipes under construction shall not be used for drainage of excavations.

- E. Maintain access to adjacent areas at all time.

3.02 TRENCHING

- A. Care shall be exercised by the Contractor to avoid disrupting the operation of existing facilities without prior written approval of the Engineer.
- B. Provide sheeting and shoring necessary for protection of the work and for the safety of personnel.

SITE ENGINEER:



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**234 PENNY LANE
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DATE	CHECKED	REVISION

**SITE
SPECIFICATIONS**

DATE JAN. 13, 2017	DRAWING NUMBER C5.0
SCALE AS SHOWN	
PROD. NO. 14115	

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the end of the test period, the structure shall be refilled to the top of the cone measuring the volume of water added. 2. This amount shall be converted to a 24-hour rate and the leakage determined on the basis of depth and size of structure. The leakage for each structure shall not exceed one gallon per vertical foot per 15 linear feet of wall (as measured in plan view) for a 24 hour period for exfiltration and there shall be no visible infiltration. C. Air Test: Alternatively, the manhole may be tested for leakage using the following procedure: 1. All lifting hole and exterior joints shall be filled and pointed with an approved non-shrinking mortar. The completed manhole shall not be backfilled prior to testing. Structures that have been backfilled shall be excavated to expose the entire exterior prior to vacuum testing or the manhole shall be tested for leakage by means of a hydrostatic test. 2. All pipes and other openings in the manhole shall be suitably plugged in a manner to prevent displacement. 3. A plate with an inflatable rubber ring the size of the top of the manhole shall be installed by inflating the ring with air to a pressure adequate to prevent leakage of air between the rubber ring and the manhole wall. 4. Air shall then be pumped out of the manhole through an opening in the plate until a vacuum is created inside of the manhole equal to 10 inches of mercury on an approved vacuum gauge. The removal of the air shall then be stopped and the test time begun. 5. The vacuum must not drop below 9 inches of mercury within a 2 minute test period. If more than 1 inch of drop in vacuum occurs within the 2 minute test period the manhole has failed the test and shall be repaired or reconstructed and retested. D. Following satisfactory test results, the manhole may be backfilled.		same container as the pump shaft seal. D. Provide 100% spare lamps and fuses for control panel. E. Provide all lubricants required for initial operation. F. Provide one (1) spare input and output card, processor, and power supply for the Programmable logic controller (PLC) system. G. Provide one (1) spare level transducer. 4.01 O & M MANUALS A. Installation of all mechanical equipment shall be done in accordance with written instructions provided by the manufacturer. Installation instructions shall be delivered with the station. B. The manufacturer shall provide 5 copies of a complete and detailed operating and maintenance manual. This manual shall provide all design criteria, general operating procedures, maintenance and servicing procedures for all major components, and as-built drawings of the contributory gravity sewer system, the pumping station and force main. All instructions and parts lists shall be prepared for the specific equipment furnished and shall not refer to similar equipment. Operating manuals must be submitted to the Town prior to final acceptance of the station. 4.02 POLYETHYLENE (PE3408) SANITARY SEWER FORCE MAINS A. This specification covers requirements for PE3408 high density polyethylene sanitary sewer force mains. All work shall be performed in accordance with these specifications and manufacturer requirements. B. <u>Referenced Standards.</u> All standard specifications, i.e., Federal, ANSI, ASTM, etc., made a portion of these Specifications by reference, shall be the latest edition and revision thereof. C. <u>Warranty and Acceptance.</u> The Contractor shall warrant all work to be free from defects in workmanship and materials for a period of one year from the date of completion of all construction. If work meets these specifications, a letter of acceptance, subject to the one year warranty period, shall be given at the time of completion. A final acceptance letter shall be given upon final inspection at the end of the one year warranty period, provided the work still complies with these specifications. In the event deficiencies are discovered during the warranty period, they shall be corrected by the Contractor without additional charge to the owner before final acceptance. During the warranty period, the Project Engineer shall determine if warranty repairs or replacement work shall be performed by the Contractor. The decision of the Project Engineer shall be binding upon the Contractor. D. <u>Polyethylene Pipe and Fittings</u> 1. <u>Qualification of Manufacturers.</u> The Manufacturer shall have manufacturing and quality control facilities capable of producing and assuring the quality of the pipe and fittings required by these Specifications. The manufacturer's production facilities shall be open for inspection by the Owner or his Authorized Representative. Qualified manufacturers shall be approved by the Project Engineer. 2. <u>Materials.</u> Materials used for the manufacture of polyethylene pipe and fittings shall be PE3408 high density polyethylene (SDR 11 or better) meeting cell classification 345444C or 345444E per ASTM D 3350; and shall be listed in the name of the pipe and fitting manufacturer in Plastics Pipe Institute's TR-4, <u>Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fitting</u>		retesting shall be at the requestor's expense, and shall be performed in accordance with the Specifications. E. Joining 1. <u>Heat Fusion Joining.</u> Joints between plain end pipes and fittings shall be made by butt fusion, electrofusion couplings and joints between the main and saddle branch fittings shall be made using saddle fusion procedures that are recommended by the pipe and fitting manufacturer. The Contractor shall ensure that persons making heat fusion joints have received training in the manufacturer's recommended procedure. The Contractor shall maintain records of trained personnel and shall certify that training was received not more than 12 months before commencing construction. External and internal beads shall not be removed. 2. <u>Butt Fusion of Unlike Wall Thicknesses.</u> Fusions of different wall thickness are acceptable, as long as the difference is limited to a one SDR difference, i.e. SDR 11 to SDR 9. Transitions between unlike wall thicknesses greater than one SDR shall be made with a transition nipple (a short length of the heavier wall pipe with one end machined to the lighter wall) or by mechanical means. 3. <u>Joining by Other Means.</u> Polyethylene pipe and fittings may be joined together or to other materials by means of (a) flanged connections (flange adapters and backup rings), (b) mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material, or (c) electrofusion. When joining by other means, the installation instructions of the joining device manufacturer shall be followed. All connections shall maintain the total pressure rating of the force main. 4. <u>Mechanical Joint Installation.</u> Mechanical joints shall be installed in accordance with the manufacturer's recommended procedure. When an OD compression mechanical coupling is used, a stiffener shall be installed in the bore of the polyethylene pipe. 5. <u>Branch Connections.</u> Branch connections to the main shall be made with saddle fittings or tees. Polyethylene saddle fittings shall be saddle fused to the main pipe. 4.03 HORIZONTAL DIRECTIONAL DRILLING W/ POLYETHYLENE PIPE A. Directional boring with PE3408 pipe shall be completed in accordance with the manufacturer's requirements and shall not in any way affect the joint connections or the overall strength characteristics of the pipe. B. References: "Mini-Horizontal Directional Drilling Manual" published by North American Society for Trenchless Technology (NASTT). "Guidelines for a Successful Directional Crossing Bid Package" published by Directional Crossing Contractors Association (DCCA). "Polyethylene Pipe for Horizontal Directional Drilling" of the Plastic Pipe Institute's Handbook of Polyethylene Piping. C. <u>Quality Control.</u> All directional boring shall be completed in such a way as not to jeopardize the existing infrastructure/facilities, such as the roadway, utility poles, subsurface utilities, structures/foundations, or significant landscaping. Prior to directional drilling, all potential conflicts shall be field verified. D. General 1. Directional drilling shall be performed in a manner required to install HDPE utility line as indicated on the drawings. Furnish all manpower and equipment required to perform the pipeline installation. The operation shall include all excavation and dewatering, drilling calculations, pilot hole, and pullback operations. Contractor shall be responsible for type of reamer, diameter, and other pertinent operations required for a complete installation. Contractor shall be responsible for mobilizing on-site with a full range of drill stems and reaming heads to allow for various factors which may occur. Drill stems shall be of proper size and diameter to allow for full thrust and torque capabilities of the drilling machines. 2. Contractor shall perform utility survey to locate information concerning existing utility lines located in the areas of the directional drilling work. 3. Directional drilling shall be accomplished by drilling from one side of the crossing to the other using an approved method. One method shall be drilling a small diameter pilot hole along the proposed utility route. Steering shall be accomplished by using drilling mud which is pumped into the drill pipe to provide rotational energy in a drill bit at the end of the drill pipe. A jet bit shall force the mud through small orifices and jet away the earth and to allow the drilled path to curve in the proper direction as the drill pipe is thrust forward. An electronic survey instrument shall be placed inside the drill pipe head. The instrument shall signal a computer of the drilled paths magnetic azimuth, vertical inclination, and orientation of the bend. This data shall be used by the drilling contractor to calculate location of the drill bit and allow steering adjustments to be made. 4. After completing the pilot hole, larger diameter reaming heads shall be pulled back in order to enlarge the hole as required to allow for the pipe pullback. The Contractor shall be responsible for multiple reaming operations as required to complete the work. Pull back operations shall be carried out as soon as possible following the final prerig. During this phase of the work, the Contractor shall continue his work operations without interruption regardless of the day of week or hour of the day. A pullback head shall be attached to the pipe to allow fastening to the swivel head reamer. The head shall be closed to prevent drilling mud from entering the main during the pullback operation. 5. Upon completion of the drilling operations, the equipment and materials used shall be removed from the site and the areas disturbed shall be restored to original conditions. The main shall be tested in accordance with Section 02730 of the Specifications. If the main fails the testing, it shall be removed and the work repeated at no additional cost to the Owner.		WATER SUPPLY SYSTEM PART 1 – GENERAL 1.01 SUMMARY A. Section includes: 1. Pipe Materials 2. Hydrants 3. Valves 4. Fittings 5. All other appurtenances necessary to complete the water main system as shown on the Contract Plans. 1.02 SUBMITTALS A. Product Data: Submit published data from manufacturers of products and accessories specified, indicating compliance with requirements to the Engineer and local municipality. 1.03 QUALITY ASSURANCE A. All materials and the installation procedure shall be in accordance with the Department of Environmental Conservation, Water Supply Division and the applicable construction ordinances of the local municipality. PART 2 – PRODUCTS 2.01 GENERAL A. Furnish ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of the same type and class of material as the conduit, or of material having equal or superior physical and chemical properties as acceptable to the Engineer as necessary to complete the water system. 2.02 WATER MAIN MATERIAL <u>C-900 PVC WATER MAIN</u> A. Pipe shall be C-900 (DR-14 200 psi) PVC (sizes as shown on the plans) conforming to current AWWA C-900, latest revision and shall be UL and FM approved. Larger size mains will be required if necessary to allow withdrawal of the required fire flow while maintaining the minimum pressure specified in the VT Water Supply Rule, Chapter 21, 8.1.1. Any proposed departure from minimum requirements shall be justified by hydraulic analysis and future water use assessment, and will be considered only in special circumstances (VT Water Supply Rule, Chapter 21 8.1.4). Push-on joint accessories shall conform to applicable requirements of ANSI/AWWA C111/A21.11. B. When a pipe material is specifically noted on the contract drawings, the contractor/developer shall not have the option of utilizing any other pipe material. Galvanized pipe or fittings shall not be used in any water system owned or maintained by the Town. The Town Water Department requires the use of polyethylene pipe sleeve encasements and/or alternate pipe materials in known or suspected corrosive soil conditions. <u>DUCTILE IRON WATER PIPE</u> A. Pipe shall be Tyton Ductile Iron Class 52 (sizes as shown on the plans) conforming to current ANSI/AWWA C151/A21.51 latest revision. Push-on joint pipe shall be minimum thickness Class 52. Push-on joint accessories shall conform to applicable requirements of ANSI/AWWA C111/A21.11. B. Pipe shall be cement mortar lined on the inside in accordance with ANSI Specification A21.4 except that the cement lining thickness shall not be less than 1/8 inch. A plus tolerance of 1/8 inch will be permitted. C. Pipe shall be given an exterior petroleum asphaltic coating in accordance with ANSI/AWWA Specification C151/ASNI A21.51. D. Pipe shall be poly wrapped with a minimum thickness of 4 mil poly in accordance with AWWA Specification C105 / ANSI A21.5, unless approved otherwise. 2.03 FITTINGS A. Ductile iron fittings shall conform to ANSI/AWWA C110/A21.10, 350 PSI working pressure. Ductile iron fittings larger than twelve inches (12") shall have a standard body length equal to Class 250 Cast Iron fittings. Cast Iron Class 250 fittings will be allowed in lieu of ductile iron fittings larger than twelve inches (12"). Ductile iron fittings shall be rated for 250 p.s.i. However, twelve inch (12") and smaller may be rated for 350 p.s.i. with the use of special gaskets. All ductile iron compact fittings shall conforming to AWWA/ANSI C153/A21.53 standards. B. Anchor tees shall be standard mechanical joint tees except that the branch is plain Class 250 cast iron or Class 350 ductile iron, cement lined, conforming to ANSI/AWWA C110/A21.10, C111/A21.11, and C104/A21.4. Anchor tees shall be Clow F-1217, U.S. Pipe U5-92 or equal. C. Mechanical Joint restraints shall be incorporated into the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron, and have a minimum working pressure of 350 psi. Twist off nuts (i.e. mega-lug) or equal shall be used to ensure proper actuating of the restraining devices. Contractors may also use approved grip ring (or equal) retainer glands. D. Bolts shall conform to ANSI Specification A21.10. E. Pipeline couplings shall conform to AWWA Standards C110 and ANSI A21.10. Mechanical joint connecting pieces of proper diameter shall be installed in accordance with the manufacturer recommendations and at locations directed by the plans or the Town Water Department. F. All fittings shall be restrained; double poly wrapped and have		concrete thrust blocks poured in place as defined herein. 2.04 TAPPING SLEEVES AND VALVES A. The Town Water Department shall be notified whenever a proposed tap is to be made on any transmission main within the municipal system. B. Only approved tapping companies shall be allowed to perform wet taps on any Town Water Department water mains. C. All materials used when tapping for a branch connection or interconnection from any Town Water Department water transmission or distribution pipelines shall be specified below 2.05 TAPPING SLEEVES For use on existing asbestos cement, gray cast iron, ductile iron or PVC C-900 pipe: A. Tapping sleeves shall be of the split sleeve design, constructed with two solid half-sleeves bolted together. Sleeves shall be constructed of ductile iron, shall have a working pressure of at least 250 psi, and shall have mechanical joint ends with end and side gasket seats. B. All iron body tapping sleeves shall be provided with a 3/4" NPT test plug, or other provisions must be made for air testing the valve and sleeve at maximum working pressure, prior to tapping. C. All bolts and nuts for mechanical joints of tapping sleeves shall be of high-strength cast iron or high-strength, low-alloy steel conforming to ANSI/AWWA C111/A21.11. D. All bolts and nuts for flanged joints of tapping sleeves shall be of high-strength, low carbon steel conforming to ANSI/AWWA C110/A21.10. E. All bolts and nuts shall be sound, clean, and coated with a rust-resistant lubricant; their surfaces shall be free of objectionable protrusions that would interfere with their fit in the made-up mechanical or flanged joint. 2.06 TAPPING VALVES A. Tapping valves shall conform to ANSI/AWWA C509 Standard for Resilient-Seated Gate Valves for Water and Sewage Systems, except as modified herein. Valves shall open counterclockwise and shall have a minimum working pressure of 200 psi. Inlet flanges shall be Class 125 conforming to ANSI Specification B16.1 or ANSI/AWWA C110/A21.10, and outlet connection shall be Standardized Mechanical Joint unless specified otherwise on the drawings for the type of pipe required for the branch or lateral pipeline. B. Tapping valves over sixteen inches (16") diameter shall be installed with their stems horizontal, shall be equipped with rollers, tracks and scrapers, and shall be provided with bypass valves unless otherwise specified. C. Buried tapping valves shall be provided with a two inch (2") square wrench nut and shall be installed with a cast iron valve box as required to allow positive access to the valve operating nut at all times. In installations where the depth from grade to top of valve operating nut is greater than 5'0", a valve stem riser shall be provided and installed such that the depth from valve stem riser nut to grade is from four feet to five feet (4'-5'), (minimum length of valve stem riser is two feet (2')). Valve stem riser shall be of high strength steel and of welded construction. D. All contractors (or others) who apply for water line tapping permits shall submit complete specifications of the tapping material they intend to use at the time the tapping permit application is submitted on 8 1/2" x 11" shop drawing sheets E. All bolts and nuts used with all pipe sleeves shall, upon final tightening and testing, be brush coated heavily with bitumastic cold-applied material to thoroughly cover all exposed surfaces of the bolts and nuts. 2.07 GATE VALVES-RESILIENT SEAT A. Valves shall be manufactured to meet all requirements of AWWA Specification C509, latest edition. Valves twelve inches (12") and smaller shall be bubble tight, zero leakage at 200 psi working pressure. Valves shall have non-rising stems, open counter clockwise, and provide a two inch (2") square operating nut with arrow cast in the metal indicating direction of opening. Each valve shall have maker's name, pressure rating and year in which manufactured cast on the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure. Gate valves shall be Mueller, Kennedy, AFC, or approved equal. B. Buried valves shall be installed with a gate valve box. C. Gate valves shall normally be placed a maximum of five hundred feet (500') apart. Tee intersections shall have a minimum of three (3) gate valves. Cross sections (four way intersections) shall have a minimum of four (4) valves. D. The Town Water Department may require all bolts, studs and nuts be made from a corrosion resistant-material stainless steel. 2.08 VALVE BOXES A. Valve boxes shall be of the three-piece Cast iron slide-type with a minimum inside shaft diameter of five and one quarter inches (5 1/4") and a six foot (6') trench depth. Valve boxes shall not transfer loads onto the valve. B. Valve boxes shall have a cast iron cover, marked "WATER". The boxes shall be dirt tight with the top of the cover flush with the top of the box rim. countersunk brass pentagon plug for paved or concrete areas, and standard two holes for grass areas. Curb box couplings and extensions will be the same material as the curb box. Both cover and upper section of the box shall be able to be located with an aqua type metal locator. C. All service connections shall be installed to the curb stop for all building lots before the street is paved. D. Valve boxes located in roadways shall have one non-adjusting	
No sanitary sewer shall be placed in service until such time as the Town has given final approval to the sewer installation, including satisfactory completion of all required tests. Service connections shall not be made until all receiving sewer mains have been completed and approved and as-builts received along with GPS coordinates and approved by the Town Wastewater Department. A. Laterals Where required on the plans, sewer service connections for one house shall be constructed of four inch (4") pipe, unless otherwise noted on the plans, of the type material specified under this section. The pipe shall be laid and its joints made as required for sewer construction in this specification. Open ends of pipes shall be properly sealed to prevent damage and intrusion of foreign matter where hookup to the building sewer is not coincident with sewer main construction. Additionally, the Contractor will provide a stable, temporary marker approved by the Town Wastewater Department from the sewer service invert up to six inches (6") above the finish grade and seated securely into the ground for ease in relocating the end of sewer service connection for hooking up the building sewer. Two (2) tie points to permanent objects shall be documented. The tie points shall be submitted to the homeowner and to the Wastewater Department. In the case of reconnection of existing services, such reconnection will be made only after the new sewer main has been completed, tested, and accepted. The excavation, bedding material, installation, and backfill for service connections shall be the same as for sewer mains. B. Cleanouts for Sewers Cleanouts for gravity sewers and force mains shall be provided at locations indicated on the plans or as directed by the Town Wastewater Department. Cleanout frames and covers against each other shall be machined to give continuous contact throughout their circumference. All iron castings shall be thoroughly cleaned and then coated with hot coal tar before being delivered. Individual laterals shall have cleanouts every one hundred feet (100'). Cleanouts shall also be installed in laterals with changes of alignment of 45 degrees or greater. C. Chimneys Chimneys shall be built of four inch (4") pipe and/or as indicated on the contract drawings. Each chimney shall be plugged or capped at end until ready to connect to existing services. Chimneys are required where the vertical drop between the finished grade surface and the main sewer line exceeds fifteen feet (15') at the wye from a service connection.		3.09 SERVICE CONNECTION							
PART 4 – PUMP STATION 4.00 SPARE PARTS A. A complete replacement pump shaft seal assembly shall be furnished with each lift station. The spare seal shall be securely fastened to the control panel and shall include complete installation instructions. B. Two (2) spare volute gaskets shall be provided. C. A spare filter cone for the seal filter shall be provided in the									

UNHSC DESIGN SPECIFICATIONS FOR
POROUS ASPHALT PAVEMENT AND INFILTRATION BEDS

PART 1 GENERAL

1.1 DESCRIPTION

- A. This specification is intended to be used for porous asphalt pavement in parking lot applications. Stormwater management functions of porous asphalt installations include water quality treatment, peak flow reduction, storm volume reduction via groundwater recharge, and increased hydrograph time lag. This specification is intended for a cold climate application based upon the field experience at the UNHSC porous asphalt parking lot located in Durham, New Hampshire, the specification has been adapted for projects in Vermont where the selection of materials and system design reflects local conditions, constraints, and objectives.
- B. The work of this Section includes subgrade preparation, installation of the underlying porous media beds, and porous asphalt mix (mix) design, production, and installation. Porous media beds refer to the material layers underlying the porous asphalt pavement. Porous asphalt pavement refers to the compacted mix of modified asphalt, aggregate, and additives.
- C. The porous asphalt pavement specified herein is modified after the National Asphalt Pavement Association (NAPA) specification outlined in Design, Construction, and Maintenance Guide for Porous Asphalt Pavements, Information Series 131 (2003) and *Design, Construction, and Maintenance of Open-Graded Friction Courses, Information Series 115* (2002).
- D. Alternative specifications for mix, such as Open Graded Friction Courses (OGFC) from Federal Agencies or state Departments of Transportation (DOT), may be used if approved by the Engineer. The primary requirements for the specifications of the mix are performance grade (PG) asphalt binder, binder content, binder draindown, aggregate gradation, air void content, and retained tensile strength (TSR).

1.2 SUBMITTALS

- A. Submit a list of materials proposed for work under this Section including the name and address of the materials producers and the locations from which the materials are to be obtained.
- B. Submit certificates, signed by the materials producers and the relevant subcontractors, stating that materials meet or exceed the specified requirements, for review and approval by the Engineer.
- C. Submit samples of materials for review and approval by the Engineer. For mix materials, samples may be submitted only to the QA inspector with the Engineer's approval.
- D. Submittal requirements for samples and certificates are summarized in Table 1 and discussed in further detail in the Materials section.

1.3 QC/QA

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.
- B. Codes and Standards - All materials, methods of construction and workmanship shall conform to applicable requirements of AASHTO and ASTM Standards or other standards as specified.
- C. QC/QA requirements for production of mix are discussed in the Materials section, and for construction of the porous media beds and paving in the Execution section.

Table 1. Submittal requirements.

Material or Pavement Course*	Properties to be reported on Certificate**
choker course, reservoir course	gradation, max. wash loss, min. durability index, max. abrasion loss, air voids (reservoir course)
filter course	gradation, permeability/ sat. hydraulic conductivity
filter blanket	gradation
geotextile filter fabric	manufacturer's certification, AOS/EOS, tensile strength certificate
stripping paint	POAB certification
binder	gradation, wear, fracture faces (fractured and elongated)
coarse aggregate	gradation.
fine aggregate	gradation.
silicone	manufacturer's certification
Fibers (optional)	manufacturer's certification
mineral filler (optional)	manufacturer's certification
fatty amines (optional anti-strip)	manufacturer's certification
hydrated lime (optional anti-strip)	manufacturer's certification

* Samples of each material shall be submitted to the Engineer (or QA inspector for mix). These samples must be in sufficient volume to perform the standardized tests for each material.
** At a minimum, more material properties may be required (refer to Materials Section).

1.4 PROJECT CONDITIONS

- A. Site Assessment should be performed per the steps outlined in IS 131 (NAPA, 2003).
- B. Construction Phasing should be performed as outlined in *IS 131* (NAPA, 2003).
- C. Protection of Existing Improvements
- Protect adjacent work from the unintended dispersal/splashing of pavement materials. Remove all stains from exposed surfaces of pavement, structures, and grounds. Remove all waste and spillage. If necessary, limit access to adjacent work/structures with appropriate signage and/or barriers.
 - Proper erosion and sediment control practices shall be provided in accordance with existing regulations. Do not damage or disturb existing improvements or vegetation. Provide suitable protection where required before starting work and maintain protection throughout the course of the work. This includes the regular, appropriate inspection and maintenance of the erosion and sediment control measures.
 - Restore damaged areas, including existing pavement on or adjacent to the site that has been damaged as a result of construction work, to their original condition or repair as directed to the satisfaction of the Engineer at no additional cost.
- D. Safety and Traffic Control
- Notify and cooperate with local authorities and other organizations having jurisdiction when construction work will interfere with existing roads and traffic.
 - Provide temporary barriers, signs, warning lights, flaggers, and other protections as required to assure the safety of persons and vehicles around and within the construction area and to organize the smooth flow of traffic.

E. Weather Limitations

- Porous asphalt, Open graded friction course, or dense-mixed asphalt shall not be placed between November 15 and March 15, or when the ambient air temperature at the pavement site in the shade away from artificial heat is below 16 °C (60 °F) or when the actual ground temperature is below 10 °C (50 °F). Only the Engineer may adjust the air temperature requirement or extend the dates of the pavement season.
- The Contractor shall not pave on days when rain is forecast for the day, unless a change in the weather results in favorable conditions as determined by the Engineer.

1.5 REFERENCES

- A. *General Porous Asphalt Bituminous Paving and Groundwater Infiltration Beds*, specification by UNH Stormwater Center, February, 2005.
- B. *Design, Construction, and Maintenance Guide for Porous Asphalt Pavements, Information Series 131*, National Asphalt Pavement Association (NAPA), 2003.
- C. *Design, Construction, and Maintenance of Open-Graded Friction Courses, information Series 115*, NAPA, 2002.
- D. *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.
- E. *Standards of the American Association of State Highway and Transportation Officials* (AASHTO), 1998 or latest edition.
- F. *Section 401- Plant Mix Pavements - General, in Standard Specifications for Road and Bridge Construction - State of New Hampshire Department of Transportation*, 2006.
- G. *Section 02725 - General Porous Pavement and Groundwater Infiltration Beds*, specification from NAPA Porous Asphalt Seminar handout, Cahill Associates, Inc., 2004.
- H. *Correlations of Permeability and Grain Size*, Russell G. Shepherd, Groundwater 27 (5), 1989. I. Groundwater, R. Allan Freeze and John A. Cherry, 1979.
- I. *Groundwater*, R. Allan Freeze and John A. Cherry, 1979.

PART 2 PRODUCTS

2.1 MATERIALS

A. Porous Media Infiltration Beds

Below the porous asphalt itself are located the porous media infiltration beds (Figure 1), from top to bottom: a 4" – 8" (10 - 20 cm) (minimum) thick layer of choker course of crushed stone (8" is preferable to alleviate compaction issues with the porous asphalt); an 8" to 12" (20 cm to 30 cm) minimum thickness layer of filter course of poorly graded sand (a.k.a. bankrun gravel or modified 304.1); 3" (8 cm) minimum thickness filter blanket that is an intermediate setting bed (pea gravel); and a reservoir course of crushed stone, thickness dependant on required storage and underlying native materials. Alternatively, the pea gravel layer could be thickened and used as the reservoir course depending upon subsoil suitability. This alternative simplifies subbase construction. For lower permeability native soils, perforated or slotted drain pipe is located in the stone reservoir course for drainage. This drain pipe can be daylighted to receiving waters or connected into other stormwater management infrastructure (wetland, storm sewer, etc.). The fine gradation of the filter course is for enhanced filtration and delayed infiltration. The high air void content of the uniformly graded crushed stone reservoir course: maximizes storage of infiltrated water thereby allowing more time for water to infiltrate between storms; and creates a capillary barrier that arrests vertical water movement and in doing so prevents winter freeze-thaw and heaving. The filter blanket is placed to prevent downward migration of filter course material into the reservoir course. The optional underdrain in the reservoir course is for hydraulic relief (typically raised off of the bottom of the reservoir stone layer for enhanced groundwater recharge). Nonwoven geotextile filter fabric (geotextile) is used only for stabilizing the sloping sides of the porous asphalt system excavation and not to be used on the bottom of the system unless needed for structural reasons.

1. Choker Course

Material for the choker course and reservoir course shall meet the following:

Maximum Wash Loss of 0.5%
Minimum Durability Index of 35
Maximum Abrasion Loss of 10% for 100 revolutions, and maximum of 50% for 500 revolutions.

Material for the choker course and reservoir course shall have the AASHTO No. 57 and AASHTO No. 3 gradations, respectively, as specified in Table 2. If the AASHTO No. 3 gradation cannot be met, AASHTO No. 5 is acceptable with approval of the Engineer. AASHTO no. 3 is also suitable for the choker course.

2. Filter course material

Filter course material shall have a hydraulic conductivity (also referred to as coefficient of permeability) of 10 to 60 ft/day at 95% standard proctor compaction unless otherwise approved by the Engineer. Great care needs to be used to not over compact materials. Overcompaction results with loss of infiltration capacity. The filter course material is commonly referred to as a bankrun gravel (modified NHDOT 304.1). In order to select an appropriate gradation, coefficient of permeability may be estimated through an equation that relates gradation to permeability, such as described in Correlations of Permeability and Grain Size (Shepherd, 1989) or in Section 8.7 Estimation of Saturated Hydraulic Conductivity (Freeze and Cherry, 1979). The hydraulic conductivity should be determined by ASTM D2434 and reported to the Engineer.

3. Filter blanket material

Filter blanket material between the filter course and the reservoir course shall be an intermediate size between the finer filter course above, and the coarser reservoir course below, for the purpose of preventing the migration of a fine setting bed into the coarser reservoir material. An acceptable gradation shall be calculated based on selected gradations of the filter course and reservoir course using criteria outlined in the HEC 11 (Brown and Clyde, 1989). A pea-gravel with a median particle diameter of 3/8" (9.5 mm) is commonplace.

4. Reservoir Course

Reservoir course thickness is dependent upon the following criteria (that vary from site to site):

- A 4" (10 cm) minimum thickness of reservoir course acts as a capillary barrier for frost heave protection. The reservoir course is located at the interface between subbase and native materials.
- 4-in. (10 cm) minimum thickness if the underlying native materials are either well drained (Hydrologic Group A soils).
- 8-in. (30 cm) minimum thickness if subdrains are installed. Subdrains insure that the subbase is well drained

d. Subdrains, if included, are elevated a minimum of 4" (10 cm) from the reservoir course bottom to provide storage and infiltration for the water quality volume. If the system is lined,

e. Subbase thickness is determined from subbase materials having sufficient void space to store the design storm,

Example: If the 25-year storm is 5.1" (13 cm) of rainfall depth, and the reservoir void space is 30%, then the minimum subbase thickness = 5.1"/0.3 = 17" (43.2 cm).

f. Pavement system and subbase thickness are > 0.65 * design frost depth for area.

Example: Durham, New Hampshire, 48" (122 cm) = D_{maximum frost}, therefore the minimum depth to the bottom of the subbase = 0.65(48") = 32" (81 cm).

Table 2. Gradations and compaction of choker, filter, and reservoir course materials.

US Standard Sieve Size Inches/mm	Percent Passing (%)			
	Choker Course (AASHTO No. 57)	Filter Course (Modified NHDOT 304.1)	Reservoir Course (AASHTO No. 3)	Reservoir Course Alternative* (AASHTO No. 5)
6/150	-	100	-	-
2 1/2/63	-	-	100	-
2/50	-	-	90 – 100	-
1 1/2/37.5	100	-	35 – 70	100
1/25	95 - 100	-	0 – 15	90 – 100
3/4/19	-	-	-	20 - 55
5/8/9.5	25 - 60	-	0 - 5	0 - 10
#4/4.75	0 - 10	70-100	-	0 - 5
#8/2.36	0 - 5	-	-	-
#300/0.075	-	0 – 6**	-	-
% Compaction ASTM D698 / AASHTO T99	95	95	95	95

* Alternate gradations (e.g. AASHTO No. 5) may be accepted upon Engineer's approval.

** Preferably less than 4% fines

5. Non-woven geotextile filter fabric

Filter fabric is only recommended for the sloping sides of the porous asphalt system excavation. It shall be Mirafi 160N, or approved equal and shall conform to the specifications in Table 3. Mirafi ® 160N is a non-woven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. 160N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

6. Alternative Applications and Residential Driveways.

The recommendations above are based on a commercial parking application for both traffic and contaminant load. Alternative applications such as residential driveways and low use applications may justify the use of alternative subbase thicknesses for the porous media beds, filter blanket, and geotextiles. Residential driveway applications have been designed with a subbase limited to only an 8" compacted choker course. Variations should consider structural load requirements for material thickness, and contaminant load for filter course thickness. A reduced total system thickness (Section 2.1.3.f) will subject the pavement to greater freeze thaw susceptibility.

Table 3. Non-woven geotextile filter fabric properties.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Values MD** CD**	
Grab Tensile Strength	ASTM D 4632	kN (lbs)	0.71 (160)	0.71 (160)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Shear Strength	ASTM D 4533	kN (lbs)	0.27 (60)	0.27 (60)
Multi-Edge Burst Strength	ASTM D 3786	kPa (psi)	2100 (305)	2100 (305)
Puncture Strength	ASTM D 4833	kN (lbs)	0.42 (95)	0.42 (95)
Apparent Opening Size (AOS)	ASTM D 4751	mm (US Sieve)	0.212 (70)	0.212 (70)
Permeability	ASTM D 4491	sec ⁻¹	1.4	1.4
Permeability	ASTM D 4491	cm/sec	0.22	0.22
Flow Rate	ASTM D 4491	lpm/m ² (gpm/ft ²)	4.477 (110)	4.477 (110)
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m ² (oz/yd ²)	217 (6.4)
Thickness	ASTM D 5199	mm (inches)	1.9 (75)
Roll dimension (width x length)		m (ft)	4.5 x 91 (15 x 300)
Roll area		m ² (yd ²)	410 (500)
Estimated roll weight		kg (lb)	99 (217)

*MD - Machine Direction, **CD - Cross-machine Direction

B. Porous Asphalt Mix

1. Mix materials

Mix materials consist of modified performance grade asphalt binder (PGAB), coarse and fine aggregates, and optional additives such as silicone, fibers, mineral fillers, fatty amines, and hydrated lime. Materials shall meet the requirements of the NAPA's Design, Construction, and Maintenance of Open-Graded Friction Courses, Information Series 115 (2002), except where noted otherwise below or approved in writing by the Engineer.

2. Polymer Modified PGAB and Mix Designs.

The asphalt binder shall be a polymer and/or fiber modified Performance Graded asphalt binder (PGAB) used in the production of Superpave Hot Mix Asphalt (HMA) mixtures. Ideally for maximum durability, the PGAB shall be two grades stiffer than that required for dense mix asphalt(DMA) parking lot installations, which is often achieved by adding a polymer and/or fiber. Mix designs will meet or exceed criteria listed in Table 5

The PGAB polymer modifiers are to be either styrene butadiene rubber (SBR) or styrene butadiene styrene (SBS). SBS is typically reserved for large projects as terminal pre-blending is required. SBR is feasible for smaller projects as it can be blended at the plant or terminal blended. The quantity of rubber solids in the SBR shall typically be 1.5-3% by weight of the bitumen content of the mix.

The dosage of fiber additives shall be either 0.3 percent cellulose fibers or 0.4 percent mineral fibers by total mixture mass. Fibers are a simple addition either manually for a batch plant or automated for larger drum plants. The binder shall meet the requirements of AASHTO M320.

The PGAB may be pre-blended or post-blended. The pre-blended binder can be pre-blended at the source or at a terminal. For post-blended addition, the modifier can either be in-line blended or injected into the pugmill at the plant.

Table 4. Post-Blended SBR Binder QC Plan requirements.

The QC Plan will contain:

- Company name and address
- Plant location and address
- Type of Facility
- Contact information for the Quality Control Plan Administrator
- QC Tests to be performed on each PGAB
- Name(s) of QC Testing Lab to perform QC and Process Control testing.
- Actions to be taken for PG Binders and SBR in Non compliance
- List of mechanical controls (requirements below)
- List of process controls and documentation (requirements below)

- Liquid SBR no-flow alert system with an "alert" located in the control room and automatic documentation of a no flow situation on the printout
- Provide means of calibrating the liquid SBR metering system to a delivery tolerance of 1%
- A batching tolerance at the end of each day's production must be within 0.5% of the amount of SBR solids specified.
- Mag-flow meter (other metering system may be considered)
- Method of sampling liquid SBR.

- Printouts of liquid SBR and PG binder quantities must be synchronized within one minute of each other
- SBR supplier certification showing the percent of SBR solids in liquid SBR
- Test results of a lab sample blended with the specified dosage of SBR. At a minimum, provide the name of the PGAB and liquid SBR suppliers, and PGAB information such as grade and lot number, and SBR product name used for the sample.
- MSDS sheet for liquid SBR.
- Handling, storage, and usage requirements will be followed as required by the liquid SBR manufacturer
- At a minimum, provide a table showing proposed rate of SBR liquid (L/min.) in relation to HMA production rate (tons per hour, TPH) for the % solids in liquid SBR, quantity of SBR specified for HMA production, and the specific gravity of the SBR.

7. QCT or QC Plan Administrator must be responsible for documenting quantities, ensuring actual use is within tolerance, etc. All printouts, calculations, supplier certifications etc. must be filed and retained as part of the QCT's daily diary/reports.

8. Method and frequency of testing at the HMA plant, including initial testing and specification testing.

*This Plan shall be submitted to the Engineer 10 days before production.

3. Anti-Stripping Mix Additives.

The mix shall be tested for moisture susceptibility and asphalt stripping from the aggregate by AASHTO T283. If the retained tensile strength (TSR) < 80% upon testing, a heat stable additive shall be furnished to improve the anti-stripping properties of the asphalt binder. Test with one freeze-thaw cycle (rather than five recommended in NAPA IS 115). The amount and type of additive (e.g. fatty amines or hydrated lime) to be used shall be based on the manufacturer's recommendations, the mix design test results, and shall be approved by the Engineer.

Silicone shall be added to the binder at the rate of 1.5 mL/m3 (1 oz. per 5000 gal). Fibers may be added per manufacturer and NAPA IS 115 recommendation if the draindown requirement cannot be met (<0.3% via ASTM D6390) provided that the air void content requirement is met (>18%, or >18% as tested with CoreLok device). Additives should be added per the relevant DOT specification and NAPA IS 115.

4. Coarse Aggregate.

Coarse aggregate shall be that part of the aggregate retained on the No. 8 sieve; it shall consist of clean, tough, durable fragments of crushed stone, or crushed gravel of uniform quality throughout. Coarse aggregate shall be crushed stone or crushed gravel and shall have a percentage of wear as determined by AASHTO T96 of not more than 40 percent. In the mixture, at least 75 percent, by mass (weight), of the material coarser than the 4.75 mm (No. 4) sieve shall have at least two fractured faces, and 90 percent shall have one or more fractured faces (ASTM D5821). Coarse aggregate shall be free from clay balls, organic matter, deleterious substances, and a not more than 8.0% of flat or elongated pieces (>3:1) as specified in ASTM D4791.

5. Fine Aggregate.

The fine aggregate shall be that part of the aggregate mixture passing the No. 8 sieve and shall consist of sand, screenings, or combination thereof with uniform quality throughout. Fine aggregate shall consist of durable particles, free from injurious foreign matter. Screenings shall be of the same or similar materials as specified for coarse aggregate. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6 when tested in accordance with AASHTO T90. Fine aggregate from the total mixture shall meet plasticity requirements.

6. Porous Asphalt Mix Design Criteria.

The Contractor shall submit a mix design at least 10 working days prior to the beginning of production. The Contractor shall make available samples of coarse aggregate, fine aggregate, mineral filler, fibers and a sample of the PGAB that will be used in the design of the mixture. A certificate of analysis (COA) of the PGAB will be submitted with the mix design. The COA will be certified by a laboratory meeting the requirements of AASHTO R18. The Laboratory will be certified by the state DOT, regional equivalent (e.g. NETTCP), and/or qualified under ASTM D3666. Technicians will be certified by the regional certification agency (e.g. NETTCP) in the discipline of HMA Plant Technician.

Bulk specific gravity (SG) used in air void content calculations shall not be determined and results will not be accepted using AASHTO T166 (saturated surface dry), since it is not intended for open graded specimens (>10% AV). Bulk SG shall be calculated using AASHTO T275 (paraffin wax) or ASTM D6752 (automatic vacuum sealing, e.g. CoreLok). Air void content shall be calculated from the bulk SG and maximum theoretical SG (AASHTO T209) using ASTM D3203.

The materials shall be combined and graded to meet the composition limits by mass (weight) as shown in Table 5.

Table 5: Porous Asphalt Mix Design Criteria.

Sieve Size (inch/mm)	Percent Passing (%)
0.75/19	100
0.50/12.5	85-100
0.375/9.5	55-75
No.4/4.75	10-25
No.8/2.36	5-10
No.20/0.075 (#200)	2-4
Binder Content (AASHTO T164)	6 - 6.5%
Fiber Content by Total Mixture Mass	0.3% cellulose or 0.4% mineral
Rubber Solids (SBR) Content by Weight of the Bitumen	1.5-3% or TBD
Air Void Content (ASTM D6752/AASHTO T275)	16.0-22.0%
Draindown (ASTM D6390)*	≤ 0.3 %
Retained Tensile Strength (AASHTO 283)**	≥ 80 %
Cantabro abrasion test on unaged samples (ASTM D7064-04)	≤ 20%
Cantabro abrasion test on 7 day aged samples	≤ 30%

*Cellulose or mineral fibers may be used to reduce draindown.

**If the TSR (retained tensile strength) values fall below 80% when tested per NAPA IS 131 (with a single freeze thaw cycle rather than 5), then in Step 4, the contractor shall employ an anti-strip additive, such as hydrated lime (ASTM C977) or a fatty amine, to raise the TSR value above 80%.

SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.ccaa-vt.com

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DRAWN

SAL

CHECKED

DSM

APPROVED

DSM

OWNER:

BURLINGTON
HARBOR MARINA
LLC
1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

BURLINGTON
HARBOR MARINA

234 PENNY LANE
BURLINGTON VT 05401

DATE	CHECKED	REVISION

PERMEABLE
PAVEMENT
SPECIFICATIONS &
DETAILS

DATE

JAN. 13, 2017

SCALE

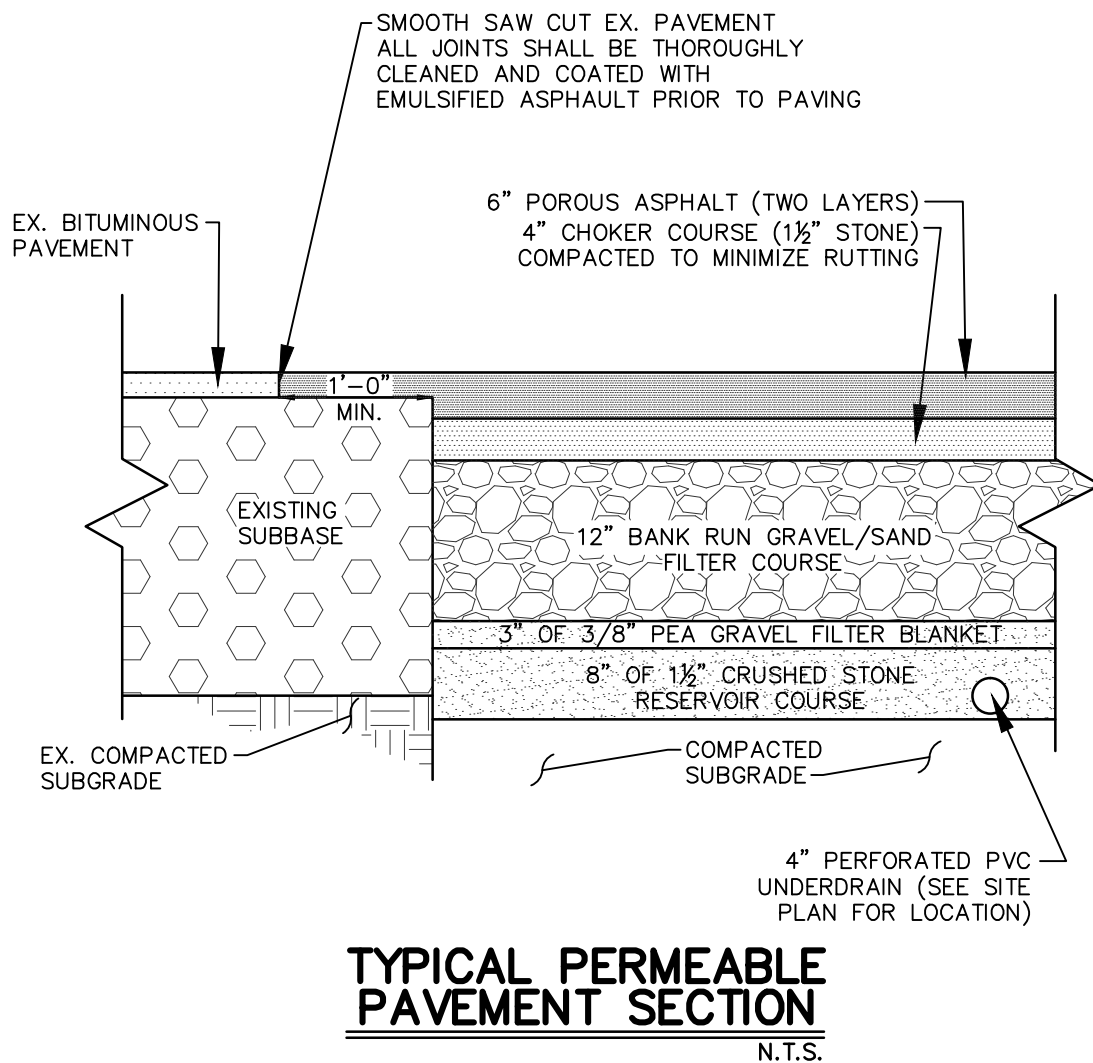
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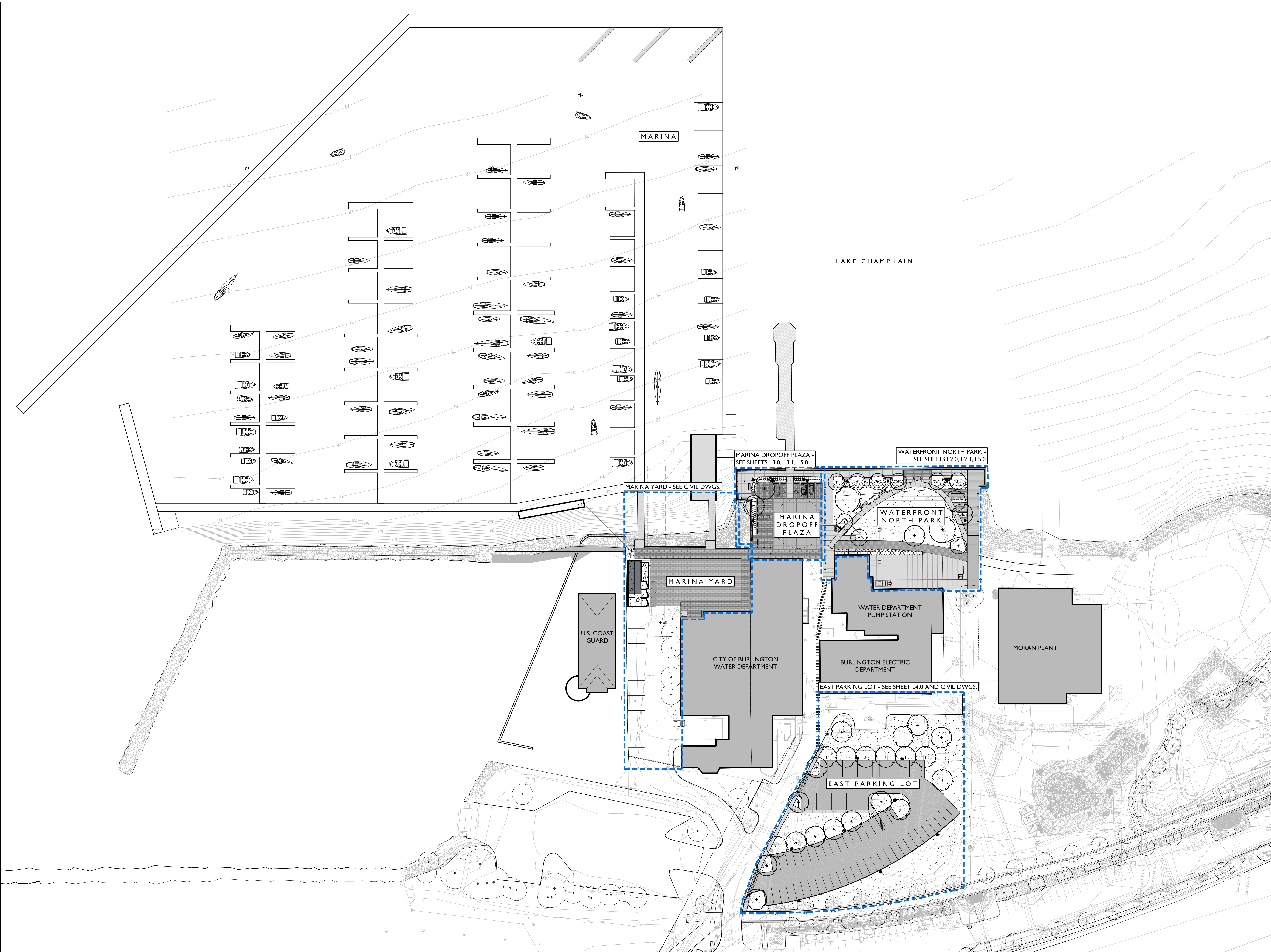
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DRAWING NUMBER

C6.0



TYPICAL PERMEABLE
PAVEMENT SECTION
N.T.S.

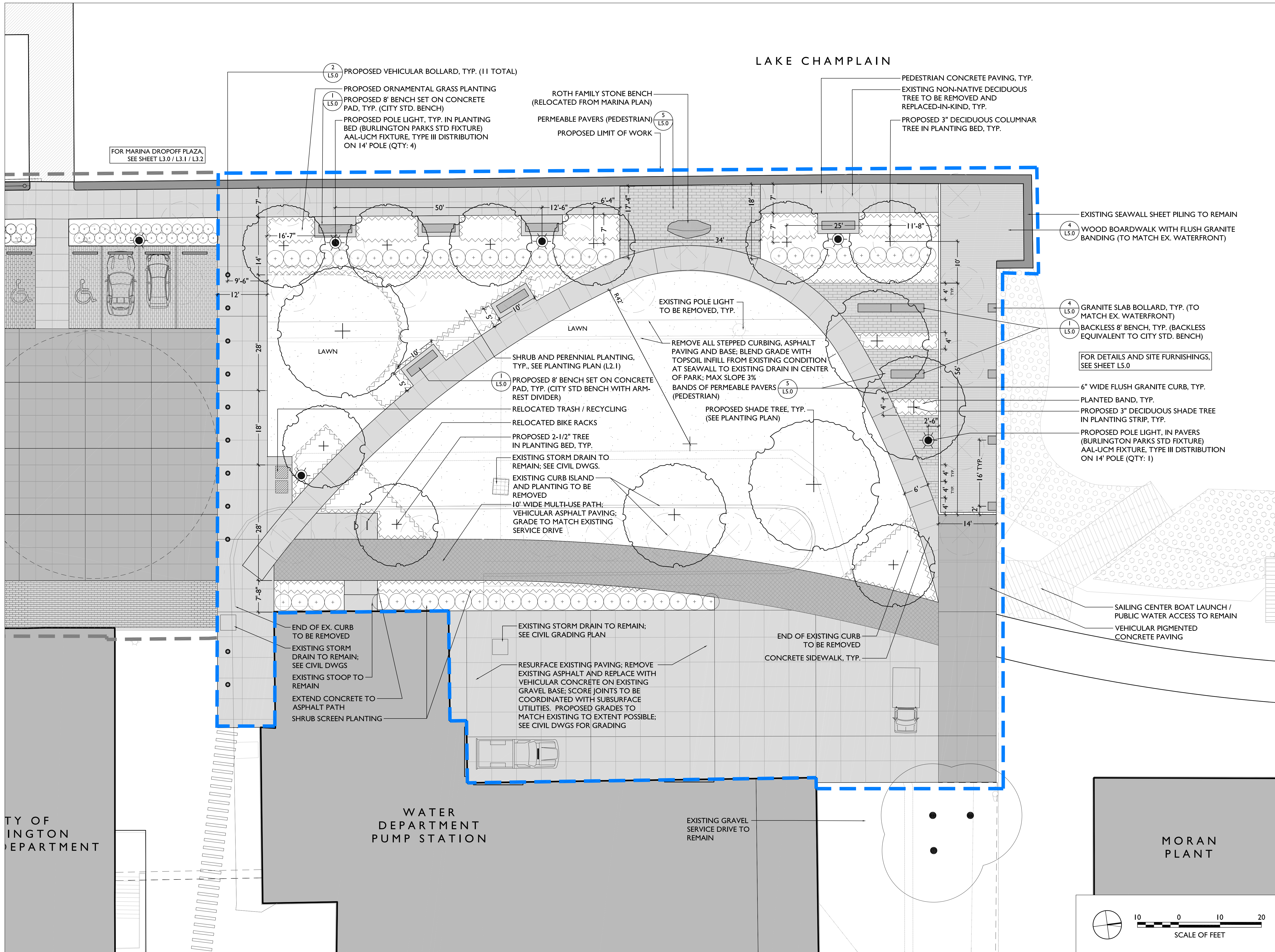


PERMITTING
PLAN
01/13/17
(NOT FOR
CONSTRUCTION)

BURLINGTON
HARBOR
MARINA

OVERALL
SITE PLAN

REVISIONS	

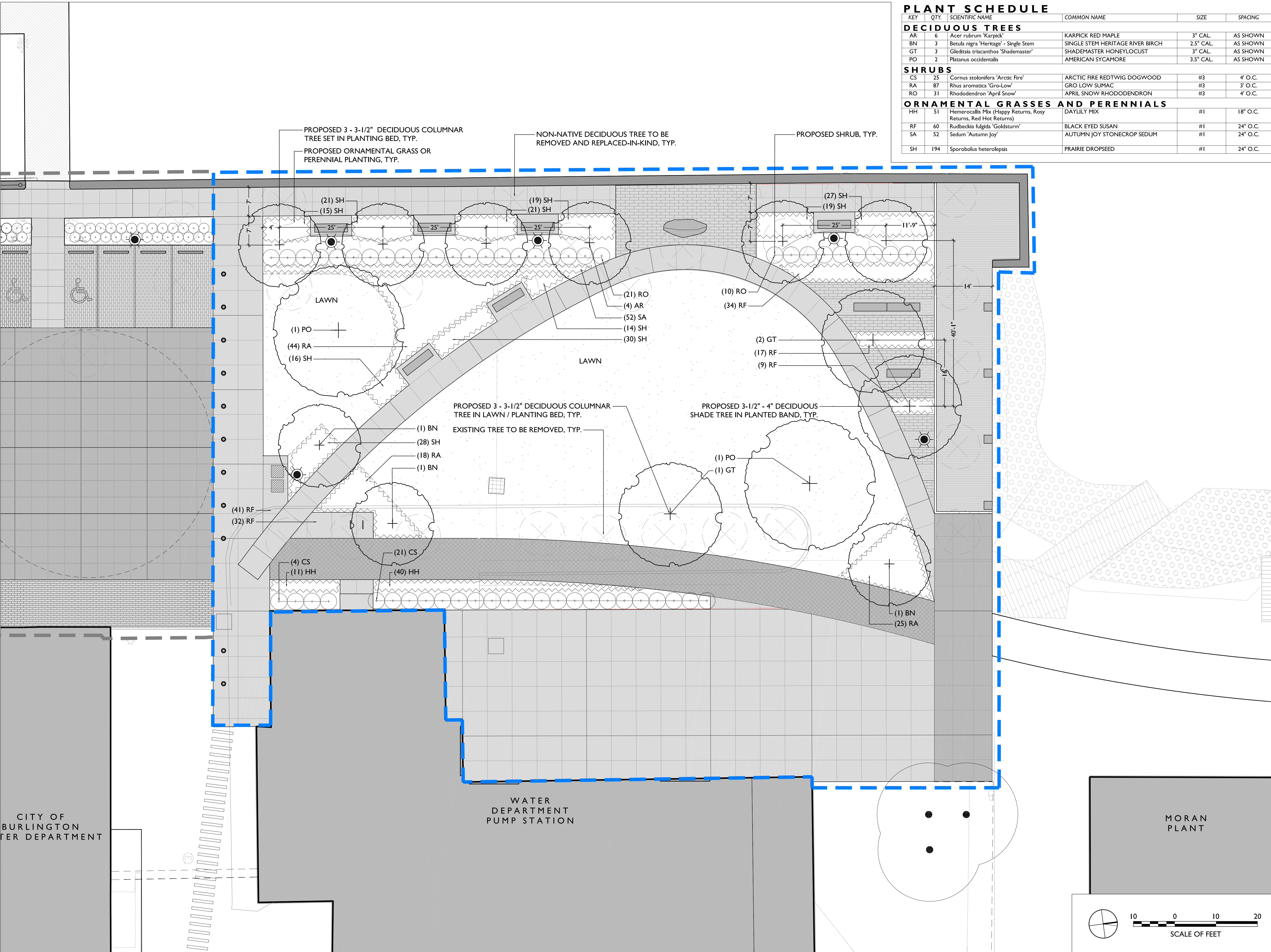


PERMITTING
PLAN
01/13/17
(NOT FOR
CONSTRUCTION)

BURLINGTON
HARBOR
MARINA

WATERFRONT
NORTH PARK
LAYOUT AND
MATERIALS PLAN

REVISIONS



PLANT SCHEDULE

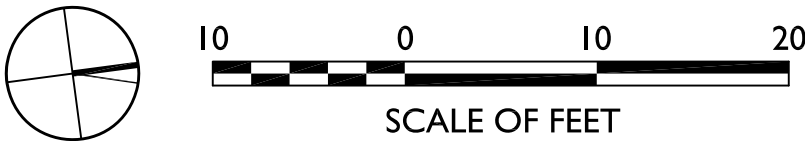
KEY	QTY.	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING
DECIDUOUS TREES					
AR	6	Acer rubrum 'Karpick'	KARPICK RED MAPLE	3" CAL.	AS SHOWN
BN	3	Betula nigra 'Heritage' - Single Stem	SINGLE STEM HERITAGE RIVER BIRCH	2.5" CAL.	AS SHOWN
GT	3	Gleditsia triacanthos 'Shademaster'	SHADEMASTER HONEYLOCUST	3" CAL.	AS SHOWN
PO	2	Platanus occidentalis	AMERICAN SYCAMORE	3.5" CAL.	AS SHOWN
SHRUBS					
CS	25	Cornus stolonifera 'Arctic Fire'	ARCTIC FIRE REDTWIG DOGWOOD	#3	4" O.C.
RA	87	Rhus aromatica 'Gro-Low'	GRO LOW SUMAC	#3	3" O.C.
RO	31	Rhododendron 'April Snow'	APRIL SNOW RHODODENDRON	#3	4" O.C.
ORNAMENTAL GRASSES AND PERENNIALS					
HH	51	Hemerocallis Mix (Happy Returns, Rosy Returns, Red Hot Returns)	DAYLILY MIX	#1	18" O.C.
RF	60	Rudbeckia fulgida 'Goldsturm'	BLACK EYED SUSAN	#1	24" O.C.
SA	52	Sedum 'Autumn Joy'	AUTUMN JOY STONECROP SEDUM	#1	24" O.C.
SH	194	Sporobolus heterolepis	PRAIRIE DROPSEED	#1	24" O.C.

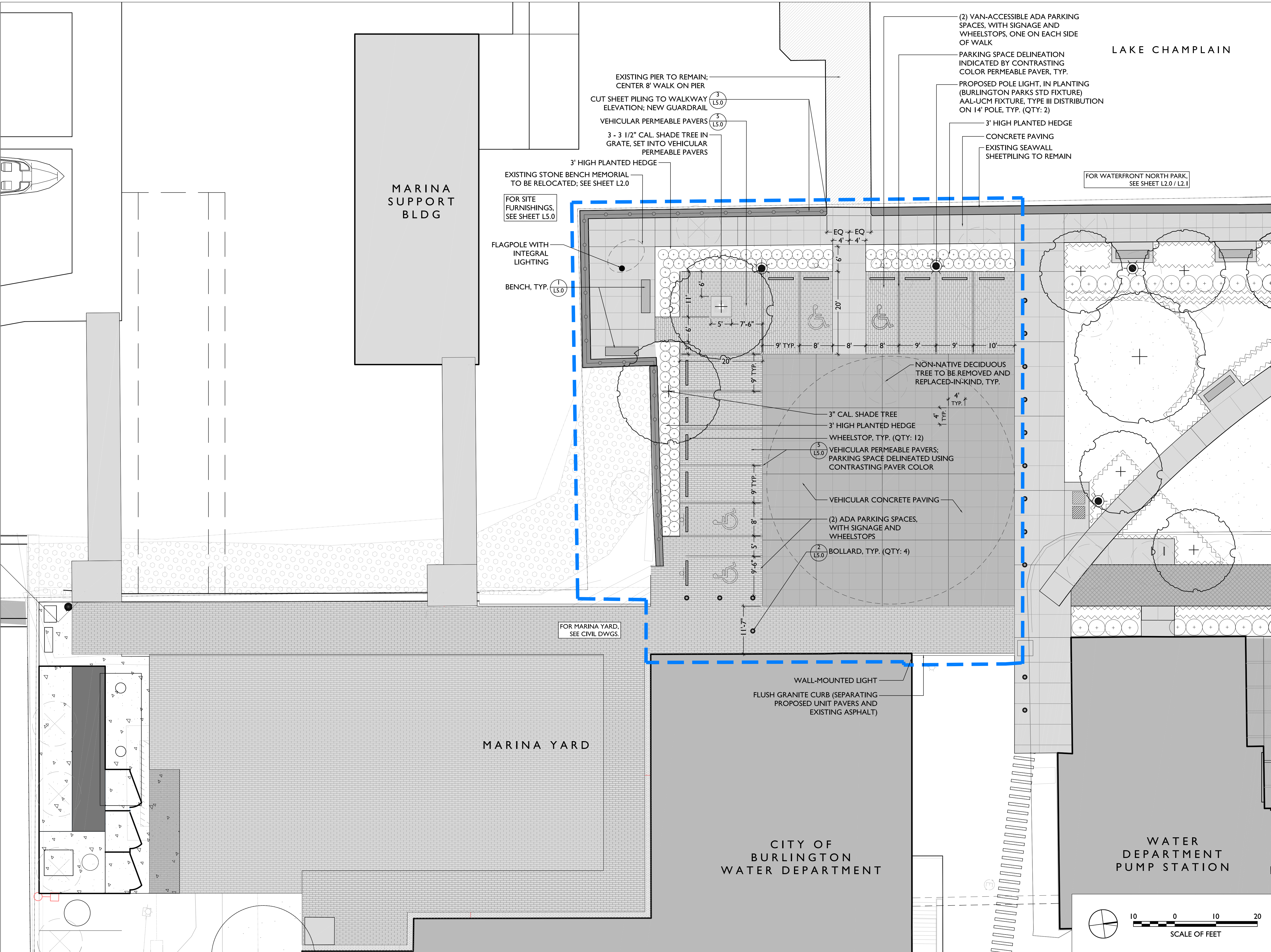
PERMITTING
PLAN
01/13/17
(NOT FOR
CONSTRUCTION)

BURLINGTON
HARBOR
MARINA

WATERFRONT
NORTH PARK
PLANTING PLAN

REVISIONS





PERMITTING
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BURLINGTON
HARBOR
MARINA

MARINA DROP
PLAZA LAYOUT
AND MATERIALS
PLAN

REVISIONS

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JOB NO. 423

SCALE 1" = 10'-0"

DATE 01.13.17

L3.0

PLANT SCHEDULE

KEY	QTY.	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING
DECIDUOUS TREES					
GT	2	Gleditsia triacanthos 'Shademaster'	SHADEMASTER HONEYLOCUST	3 - 3.5" CAL.	AS SHOWN
SHRUBS AND ORNAMENTAL GRASSES					
CK	46	Calamagrostis acutiflora 'Karl Foerster'	FEATHER REED GRASS	#2	30" O.C.
PO	61	Physocarpus opulifolius 'Little Devil'	LITTLE DEVIL NINEBARK	#3	30" O.C.

WAGNERHODGSO
LANDSCAPE ARCHITECTS

T802.864.0010 F802.864.6267 www.wagnerhodgson.com

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BURLINGTON HARBOR MARINA

MARINA DROPOFF PLAZA PLANTING PLAN

REVISIONS

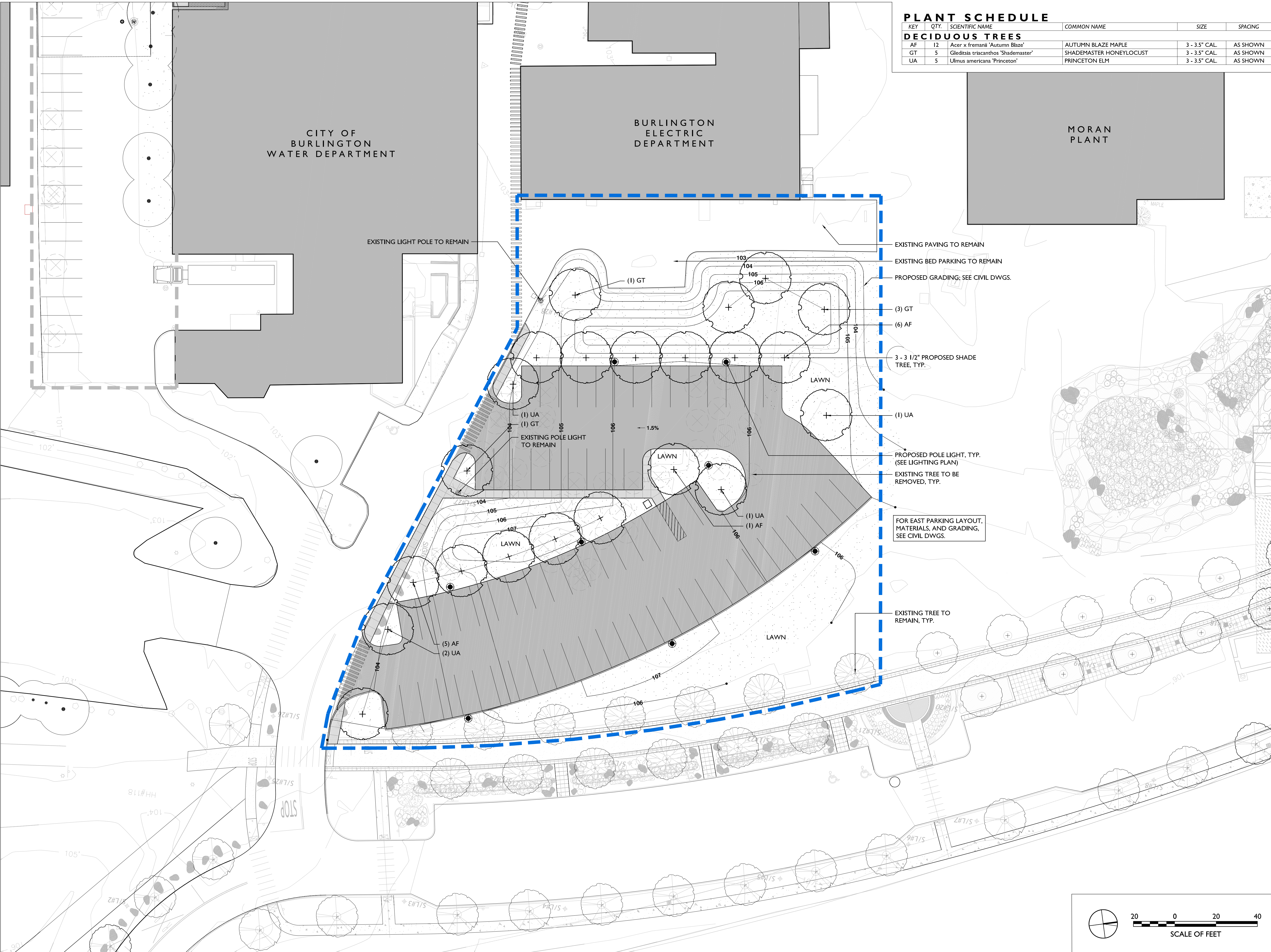
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JOB NO. 423

SCALE 1" = 10'-0"

DATE 01.13.17 **LS.**

L3.1



PLANT SCHEDULE					
KEY	QTY.	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING
DECIDUOUS TREES					
AF	12	Acer x fremanii 'Autumn Blaze'	AUTUMN BLAZE MAPLE	3 - 3.5" CAL.	AS SHOWN
GT	5	Gleditsia triacanthos 'Shademaster'	SHADEMASTER HONEYLOCUST	3 - 3.5" CAL.	AS SHOWN
UA	5	Ulmus americana 'Princeton'	PRINCETON ELM	3 - 3.5" CAL.	AS SHOWN

WAGNERHODGSON
LANDSCAPE ARCHITECTURE
T802.864.0010 F802.864.6267 www.wagnerhodgson.com

PERMITTING PLAN
01/13/17
(NOT FOR CONSTRUCTION)

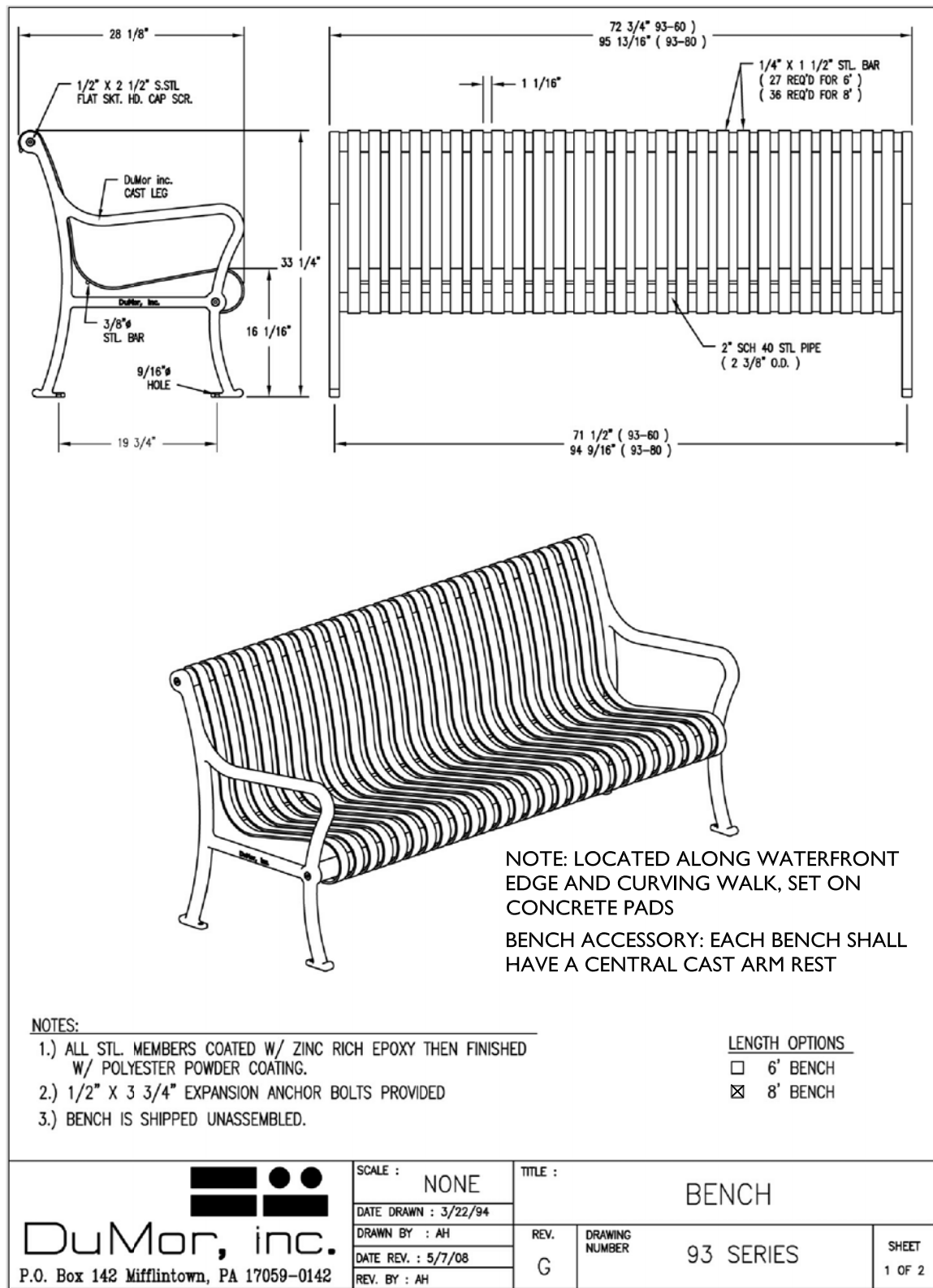
BURLINGTON HARBOR MARINA

EAST PARKING PLANTING PLAN

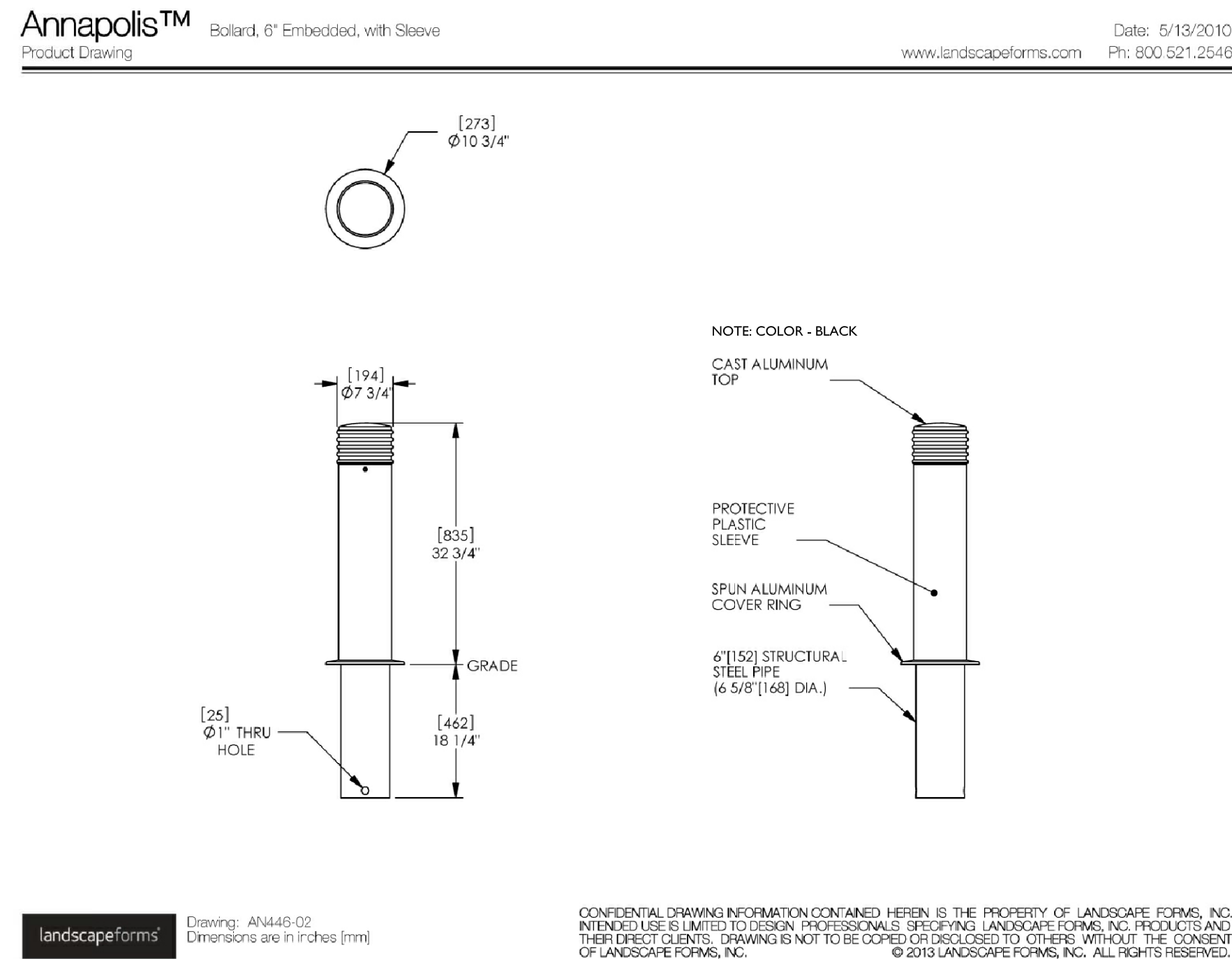
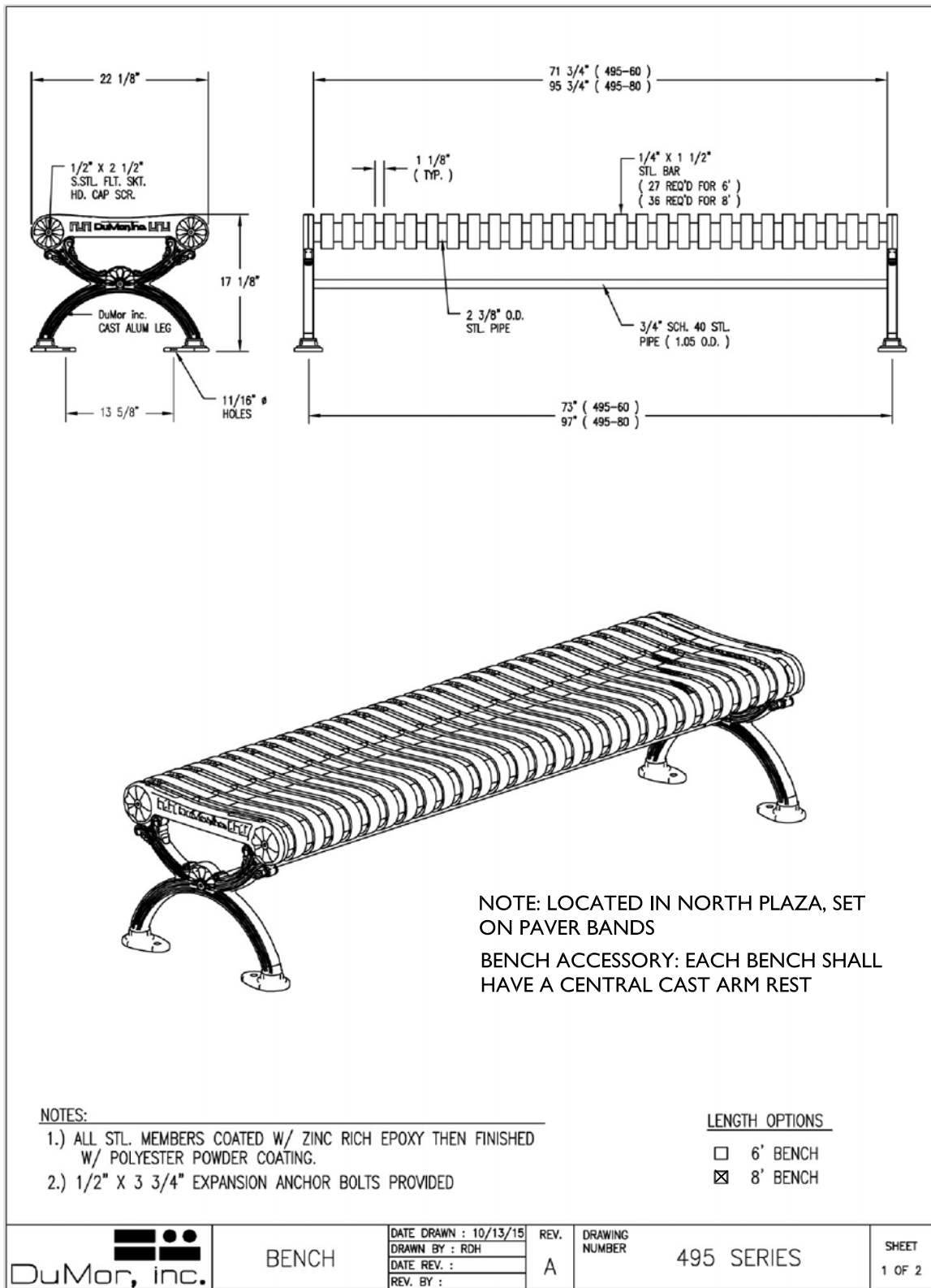
REVISIONS

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DATE 01.13.17	

L4.0



1 BENCH, TYP.
*NOT TO SCALE



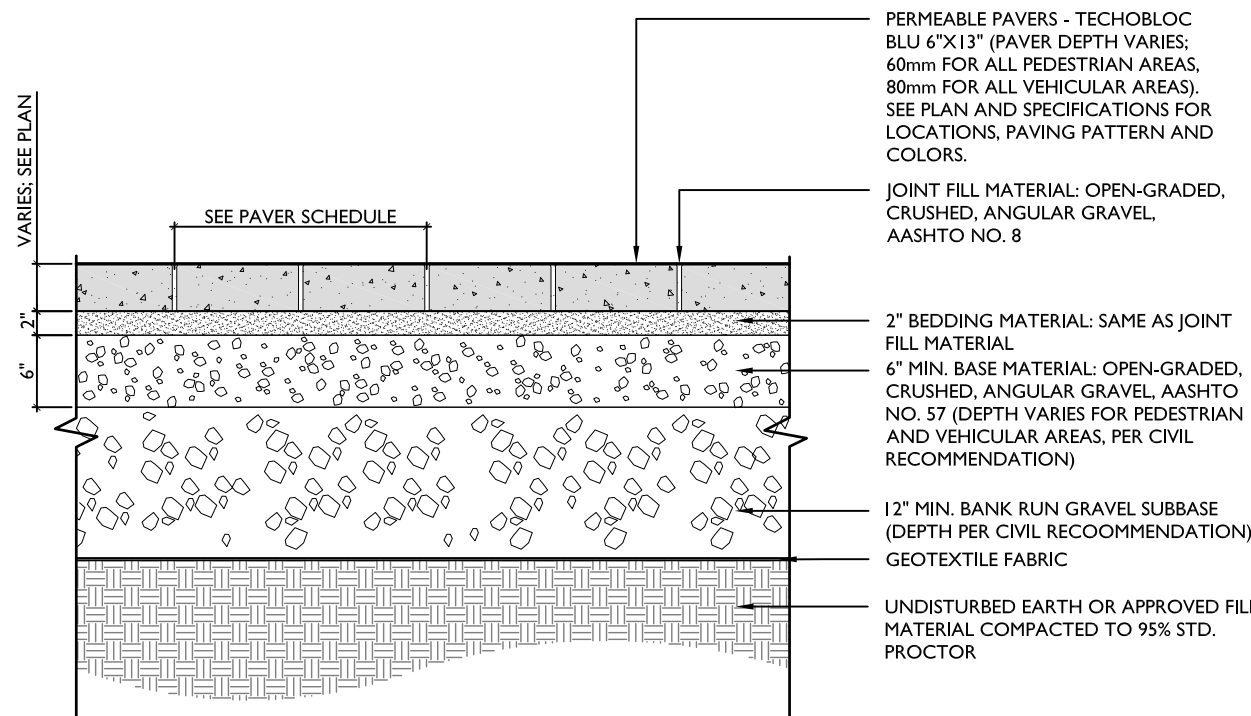
2 BOLLARD, TYP.
*NOT TO SCALE



3 TOP OF SEAWALL RAILING @ DROPOFF PLAZA
*NOT TO SCALE



4 BOARDWALK WITH GRANITE SLAB BOLLARDS
*NOT TO SCALE



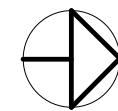
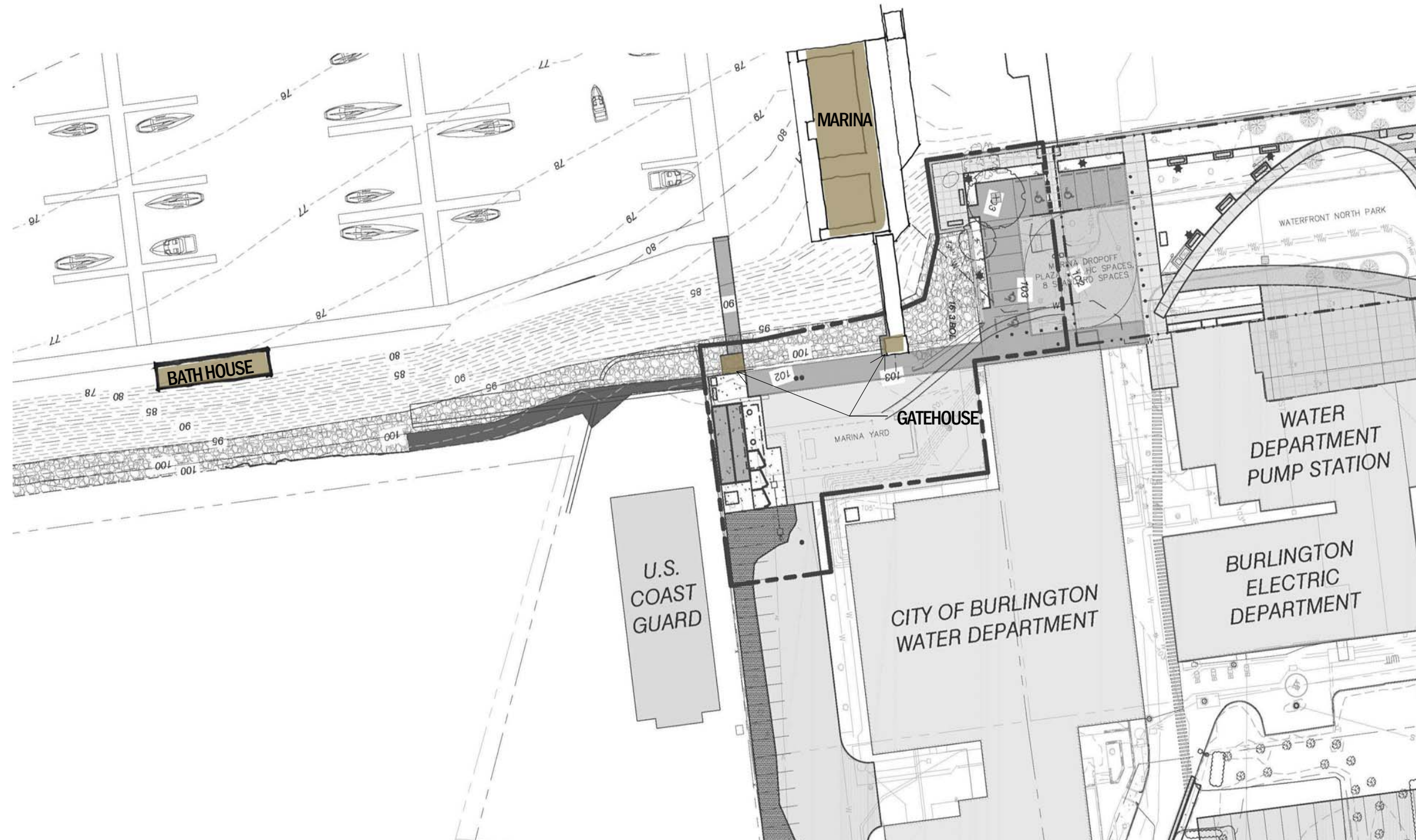
5 PERMEABLE PAVING
3/4" = 1'-0"

BURLINGTON HARBOR MARINA

PROPOSED PRODUCT DETAILS

REVISIONS

1	
2	
3	
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9	
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PROJECT NORTH

GRAPHIC SCALE



1 of 5

BURLINGTON HARBOR MARINA

BURLINGTON, VT

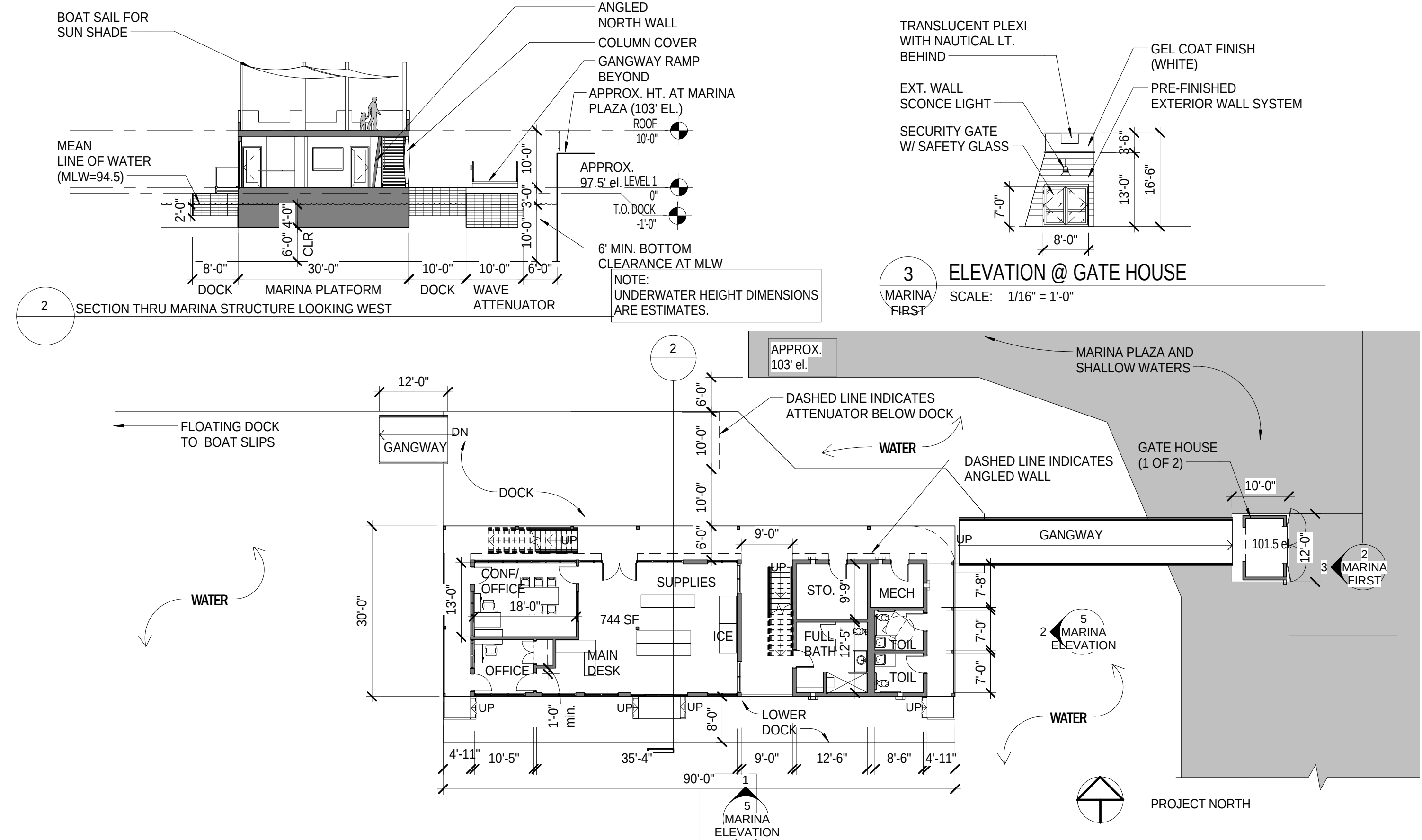
NOV. 21, 2016
A1524

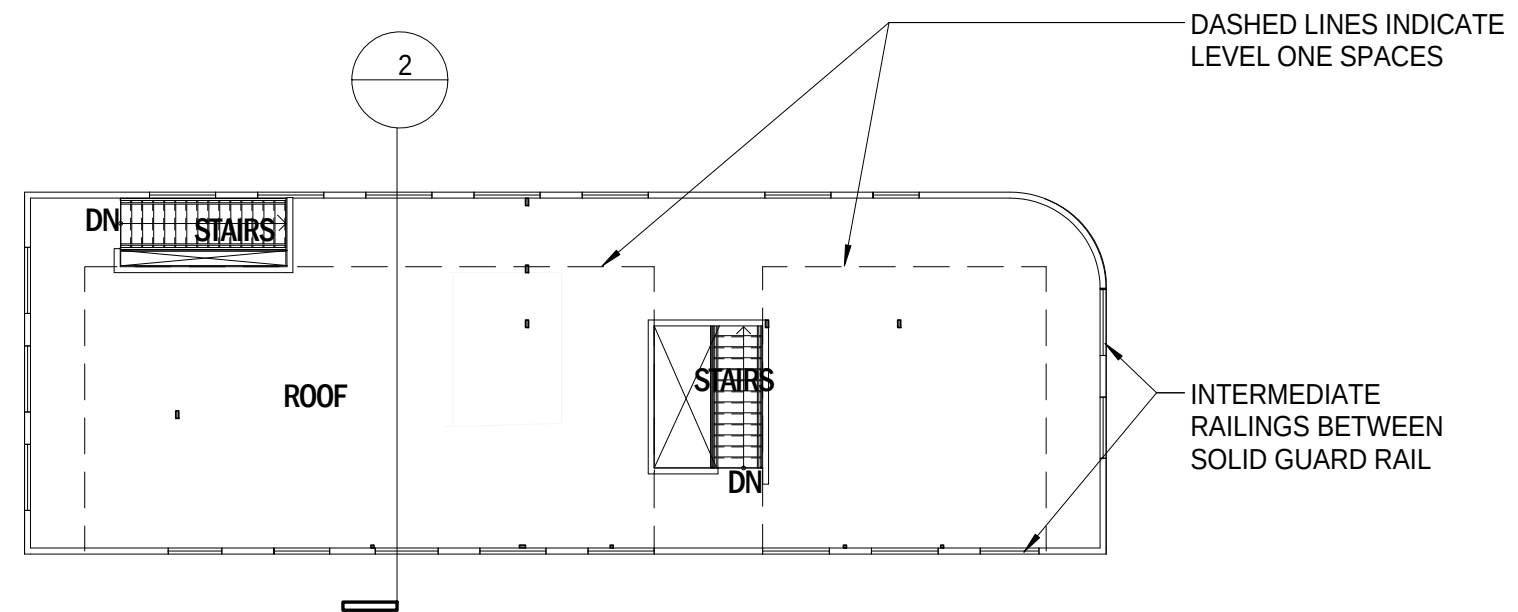
SITE CONCEPT PLAN

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BURLINGTON HARBOR MARINA
BURLINGTON, VT

NOV. 21, 2016
A1524

MARINA SERVICE CENTER CONCEPT - ROOF PLAN



PROJECT NORTH

GRAPHIC SCALE

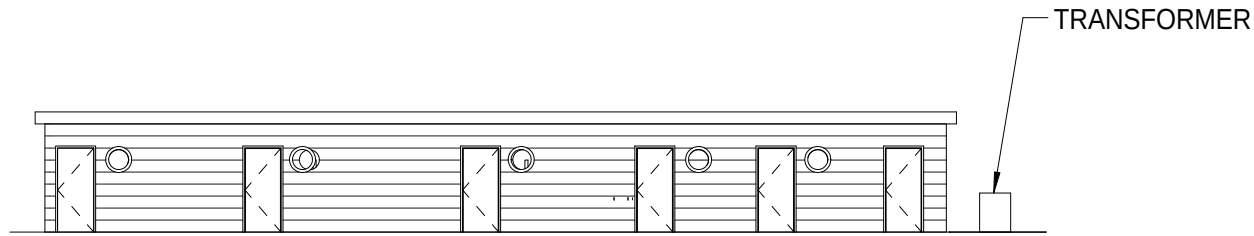


3 of 5

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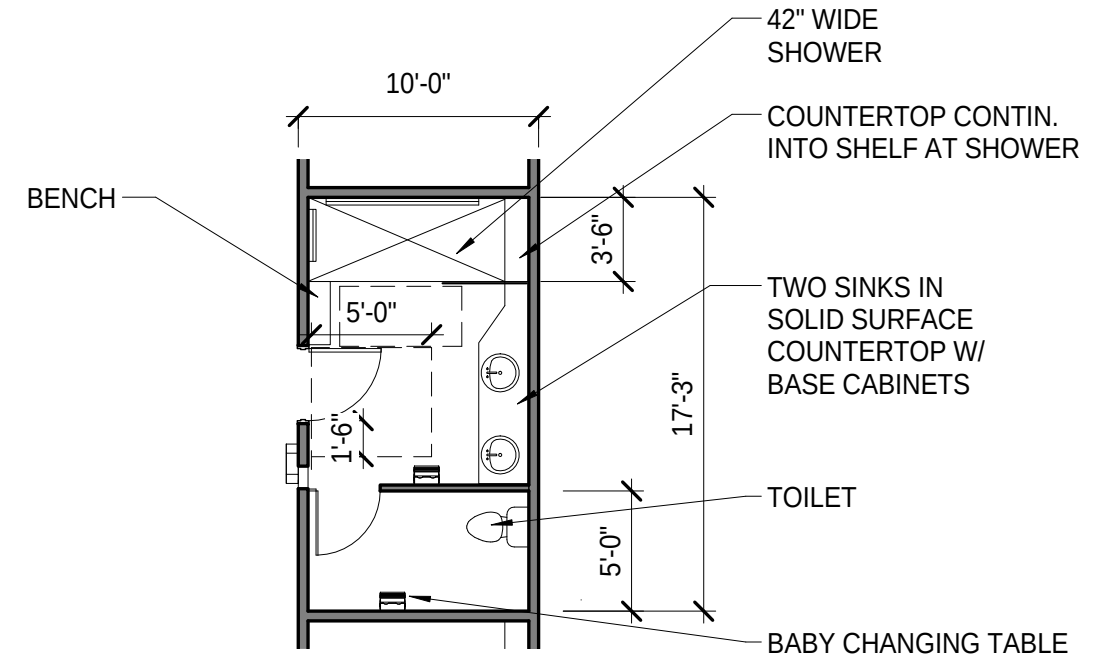
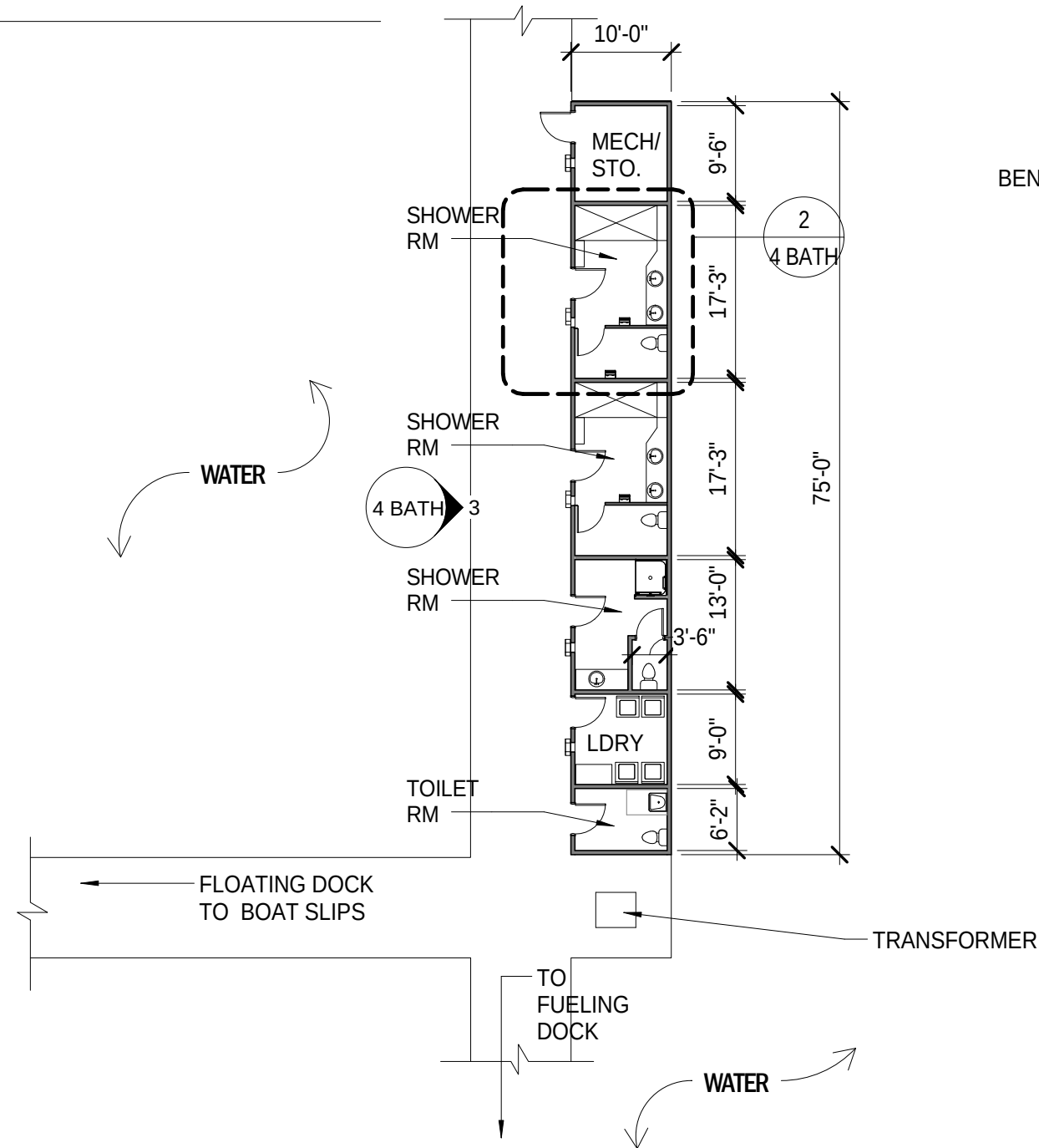
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3
4
BATH

BATHHOUSE WEST ELEVATION

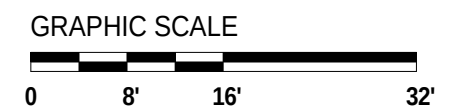
SCALE: 1/16" = 1'-0"



2
4
BATH

BATH HOUSE TYPICAL SHOWER ROOM

SCALE: 1/8" = 1'-0"



4 of 5

BURLINGTON HARBOR MARINA
BURLINGTON, VT

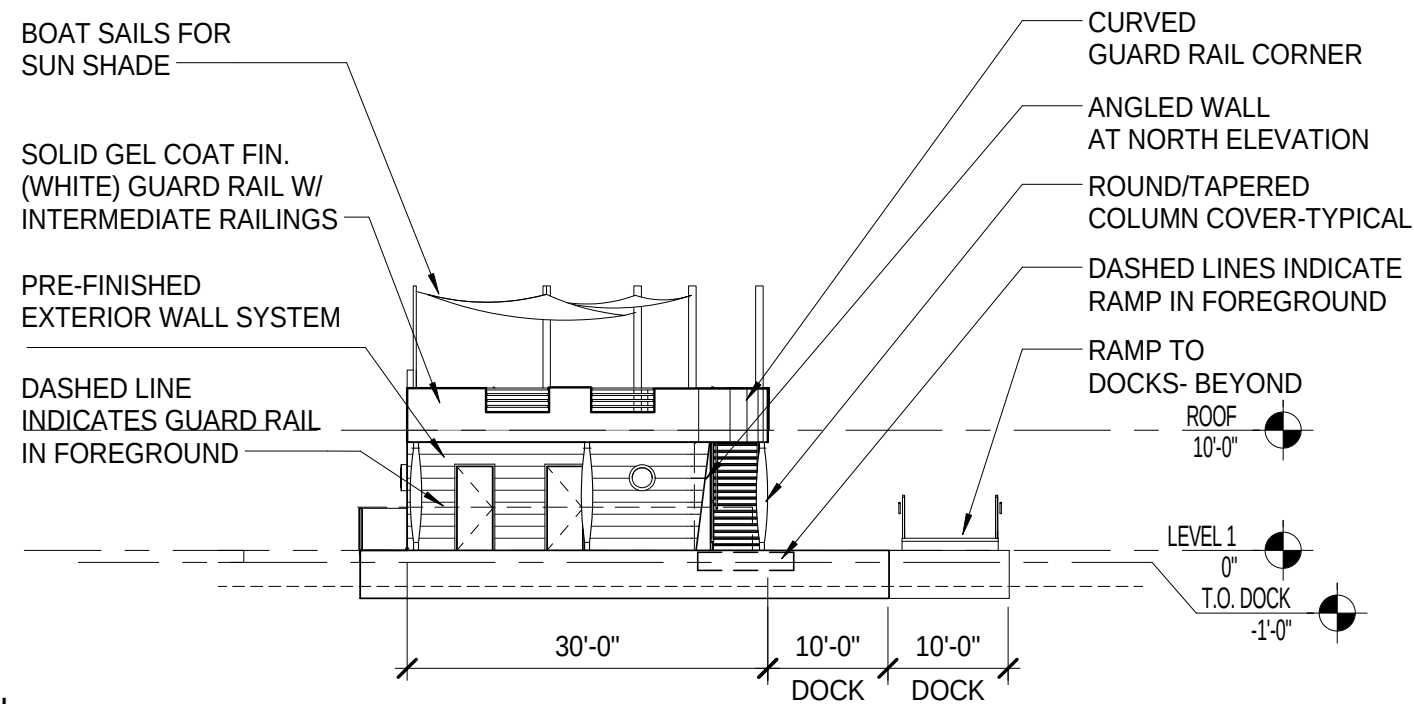
NOV. 21, 2016
A1524

BATH HOUSE CONCEPT PLAN

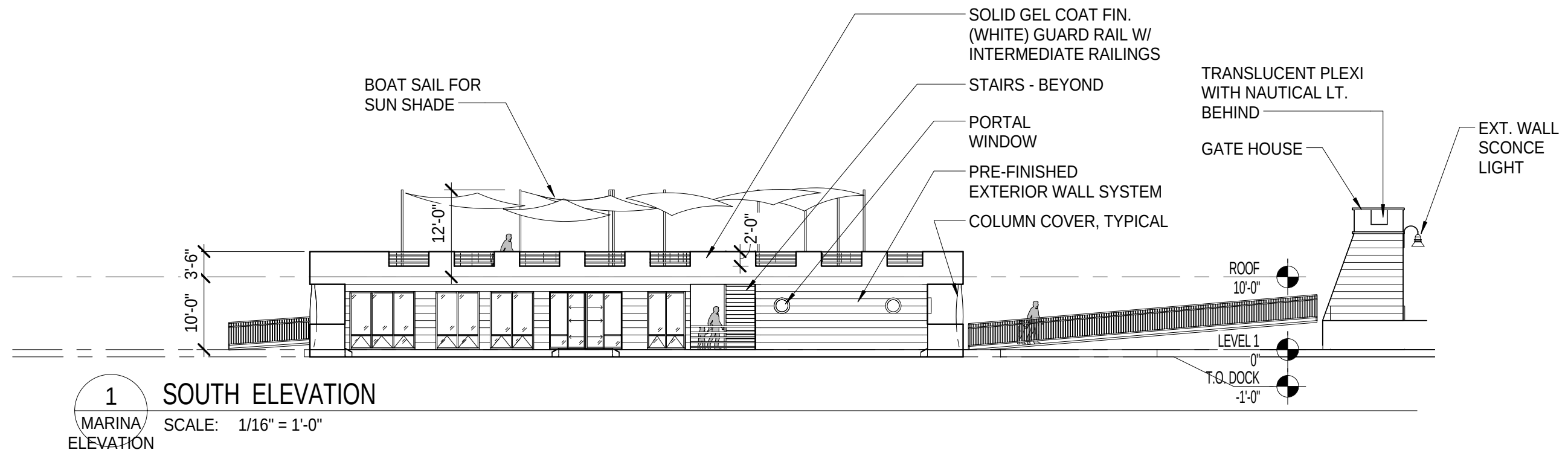
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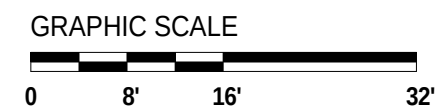
2 EAST ELEVATION
MARINA ELEVATION
SCALE: 1/16" = 1'-0"



BURLINGTON HARBOR MARINA
BURLINGTON, VT

MARINA SERVICE CENTER CONCEPT - SOUTH ELEVATION

NOV. 21, 2016
A1524



5 of 5

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Waterfront North Park | Marina Dropoff Plaza and Support Building (looking southwest)

01/26/2017

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Waterfront North Park | Roth Family Memorial Bench (Relocation Sketch, looking west)

01/13/2017

WAGNERHODGSON
LANDSCAPE ARCHITECTURE



**Burlington Department of Public Works
Stormwater Program**

234 Penny Lane (Water Plant)
Burlington, VT 05401

PH: 802-863-4501 Email: stormwater@burlingtonvt.gov



Standard Erosion Prevention & Sediment Control (EPSC) Plan

This questionnaire and associated EPSC plan sheets are required for projects

- on properties other than single family (R1) or duplexes (R2) that require a level II or III Certificate of Appropriateness or Major Impact zoning applications and involve 5000 sq. ft. or more of earth disturbance; or
- any activity where a zoning permit is not required but where the project involves 10,000 sq. ft. or more of earth disturbance; or
- if requested by the Stormwater Program due to project characteristics such as slope, soils or proximity to drainage structures or waterbodies.

Please note that you must submit EPSC plan and detail sheets as outlined in section A below.

All projects involving redevelopment or addition of impervious surface must submit the stormwater management screening project (attached) for evaluation or meet with the Stormwater Program to determine the stormwater management requirements for your project.

1. Project Location 234 Penny Lane
2. Zoning Permit Address (if different from above): _____
3. Brief Project Description (i.e. building construction, subdivision, site work)
Construction of new marina. Site improvements include marina yard with associated utilities,
public park & plaza and 68 space parking lot.
4. Owner Name: Burlington Harbor Marina, LLC (Lessee)
5. Owner Mailing Address: 25 Cherry St Burlington Vermont 05482
6. Owner Phone: 802 863-1333 6. Owner email: jwallace@gmavt.net
7. Contractor Name: _____ ☒ Contractor not known at this time
8. Contractor Phone: _____ 9. Contractor Email: _____
10. Estimated Project Start Date June 2017 Estimated End Date June 2018
11. Area of Land Disturbance 45482 sq. ft.
12. Total proposed (existing + new) amount of impervious: 97494 sq. ft.
14. Does your project require a State Construction Stormwater Permit (9020 or INDC) ? ☒ Yes ☐ No
(You will be required to submit proof of your authorization to discharge prior to initiation of earth disturbance).

A. REQUIRED PLAN SHEETS:

15. Plan sheet(s) MUST BE ATTACHED showing the following:

- | | |
|---|--|
| ☒ Limits of disturbance | ☒ Direction of stormwater flow on site |
| ☒ Location of stockpiles (if any) | ☒ Location of sediment control BMP's (silt fence etc.) |
| ☒ Location of stabilized construction entrances | ☒ Stabilization measures |
| ☐ Phasing plan (if appropriate) | |

*impervious = any surface off of which water runs off rather than infiltrates, including, but not limited to rooftops and paved/unpaved (gravel/packed dirt) driveways, walkways and patios

16. Detail sheet MUST BE ATTACHED and include details for all EPSC measures listed on the EPSC Plan Sheet.

Additionally, notes must be included related to:

- ☐ Daily inspection of roadways and sweeping as necessary
- ☒ Dewatering measures (if applicable)
- ☒ Temporary site stabilization requirements
- ☒ Final site stabilization requirements
- ☒ Winter site stabilization (for disturbance after November 1)
- ☒ Inspection requirements

B. EPSC QUESTIONNAIRE (See last page for typical solutions to these questions)

A) Do you anticipate the need for any dewatering of excavations during the construction? ☐ Yes ☒ No

- If yes, please indicate which plan sheet has details for how dewatering operations will be managed to prevent the discharge of sediment laden water. Sheet(s): _____

B) Will excavated soil be stockpiled on the site? ☒ Yes ☐ No If yes, show locations and EPSC measures for the stockpile on plan sheet(s)

- If no, where is the ultimate disposal of excess soil? _____

C) Do you plan to park construction vehicles on or disturb City owned property like the greenbelt area? ☐ Yes ☒ No

- If yes, tell us how you agree to repair all disturbances or damage to City owned property and provide a written approval from the City allowing construction vehicles to park on City owned property.

Note - parking on City land but in new parking lot area

- If no, then please monitor all construction and visitor vehicles and advise all not to park on City owned property.

D) Will stockpiles or disturbed soils be present and/or exposed after Nov. 1st of any construction year? ☐ Yes ☒ No

- If yes, tell us how you plan to stabilize any stockpile and/or disturbed soils.

Do you agree to abide by the following conditions?

☒ Y ☐ N Applicant will call 863-4501 or email gjohnson@burlingtonvt.gov at least 24 hours prior to initiating earth disturbance and submit the **name and contact (cell phone and email) of the erosion control coordinator for the project**

☒ Y ☐ N Applicant will post the attached notice in a visible location

☒ Y ☐ N I acknowledge that it is the responsibility of the owner and his/her representatives to ensure that:

- sediment does not enter surface water bodies (streams, ditches, ponds, lakes, wetlands etc.)
- sediment does not enter City conveyance infrastructure (catch basins, sewers etc.) and
- All sediment must be removed from the city ROW (sidewalks and roadways) by the end of each work day.

☒ Y ☐ N Sediment control measures will be installed prior to the initiation of earth disturbance.

- ☒Y ☐N During the non-winter construction season (April 15 – November 1): After an initial **14 day** period of initial disturbance, temporary or permanent stabilization (mulching, erosion control matting or tarps for stockpiles, or other approved method) of exposed areas and stockpiles will occur at the end of each work day unless:
- Earthwork is to continue in the area within the next 24 hours **and** there is NO liquid precipitation forecast for the next 24 hours; or
 - If work is occurring in a self contained excavation (no outlet) with a depth of 2 feet or greater (e.g. house foundation excavation or utility trenches).
- ☒Y ☐N During the winter construction period from November 1 to April 15, any **new disturbance** must be temporarily or permanently stabilized (mulching, erosion control matting or tarps for stockpiles, or other approved method) will occur at the end of each work day unless:
- Earthwork is to continue in the area within the next 24 hours **and** there is NO liquid precipitation forecast for the next 24 hours; or
 - If work is occurring in a self-contained excavation (no outlet) with a depth of 2 feet or greater (e.g. house foundation excavation or utility trenches)
- ☒Y ☐N The perimeter of the site and all BMPs will be inspected at the **end of each workday** to ensure that sediment will not leave the site. If sediment has travelled beyond the site boundary, it shall be swept up or otherwise removed and deposited on-site in an upgradient area at the **end of each work day**.
- ☒Y ☐N The owner and his/her representatives shall abide by the best management practices (BMPs) indicated in this plan and conditions and in the Vermont DEC Low Risk Site Handbook for Erosion Prevention and Sediment Control (2006). Contact 802-863-4501 for a hard copy or go to the web:
http://vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf
- ☒Y ☐N **If soils will be exposed after November 1st and winter construction has not been permitted the project will notify DPW prior to October 15th and ensure that sediment control is installed PRIOR to soil freezing.** If the project is completed during the winter months, an additional inspection will be required to ensure that the site is buttoned up for the winter.
- ☒Y ☐N Within 48 hours of reaching final grading, the exposed soil will be seeded and mulched or covered with erosion control matting (for slopes steeper than 3:1 or high wind prone areas). Erosion control matting is preferred.
- ☒Y ☐N The owner will contact DPW to schedule a stabilization inspection when site work is finished and stabilization measures (seeding and mulching or matting) have been installed.

AGREEMENT

By filling out and signing this plan, I agree to abide by the terms and conditions outlined above. Failure to follow this plan can result in a stop work order by the City of Burlington, fines, or both.

By: ☒ Owner ☐ Contractor

Jack Wallace - Managing member

Name



Signature

1-30-17

Date

Additional Conditions of Approval:

Burlington Harbor Marina

Existing Conditions: Description of existing conditions, description of existing stormwater system existing drainage issues, connectivity to City system

The site is located on two parcels of land owned by the City of Burlington abutting Lake Champlain. There are three primary project components and the following will describe the stormwater management within each one.

1. Employee Parking Lot east of buildings. This area currently hosts a 3,950 SF satellite bit. conc. parking lot and green space area that is served by Penny Lane. Stormwater from this areas flows via sheet flow from the parking lot in an easterly direction to an existing catch basin. Flows are then conveyed from this structure via a series of 18" HDPE pipes to Lake Champlain at an outfall located at the north end of the Fishing Pier parking lot.
2. Fishing Pier Parking Lot - This 10,370 SF parking lot for the Fishing Pier and 6,840 SF lot and circulation area for the Water Department Pump Station building currently benefits from two separate collection and conveyance systems that discharge to outfalls to Lake Champlain. The Middle parking lot system includes two catch basins which in turn are conveyed through a series of 12" CMP's to the outfall. The south system located at the south end of the parking lot receives flows from the west end of Penny Lane and conveys these flows and that from one catch basin within the parking to a drainage manhole and then via a 15" RCP to the outfall located just north of the fishing pier.
3. Picnic Shelter Pavilion Area and Water Dept. Parking Lot. – The existing 2,790 SF Pavilion shelter and connector walkways is located between the lake and the Water Dept. Parking lot to the east. Under existing conditions, runoff from the parking lot is collected in a sole catch basin located in the southwest corner of the facility and is conveyed in a 12" CMP to the Lake Champlain outfall. The remaining area near the shelter either drain back to the sole catch basin or sheet flow to the lake.

Proposed Conditions: description of proposed conditions, brief description of proposed stormwater system, proposed method of discharge to receiving water or City system (overland flow, direct connection via pipe, existing or new manhole or CB). General Statement: The underlying sand subgrade of the site provide suitable infiltration rates in support of the use of permeable pavement and permeable pavers without the use of underdrains.

1. Employee Parking Lot east of buildings. Consistent with the original WAN approval, this area will be redeveloped with an expanded parking lot. The shape of the lot has been reconfigured to enable a sweeping pedestrian access to be installed along the east edge of the facility from Penny Lane to the Moran Plant.

This 21,430 SF parking facility constructed with pervious pavement will replace the existing 3,950 SF impervious parking lot.

A small amount of curbing will be installed on Penny Lane to provide transition curbing from Penny Lane into the new parking facility.

2. Fishing Pier Parking Lot - The existing parking lot is being removed in favor of:
 - a. The creation of the Waterfront Park North within the northern two-thirds of the project site. This will include the creation of new green space and a series of hardscape access ways and sitting areas. A series of trees will be placed in a stone dust surface treatment along the west edge of the park. This site will continue to sheet flow toward the existing CB location.
 - b. The existing bit. conc. located on the west side of the Water Department Pump Station Building is proposed to be resurfaced with CIP concrete. No change in sheet flow away from the building is proposed.
 - c. The far southern third of the site will be converted into a marina drop-off area that integrates with the access way to the Fishing Pier. The proposed surfaces include pervious pavers in the parking locations, and impervious pavers in the inner and outer limits of the drop-off area. 5' green space bands line the outside edges of the parking spaces. Infiltration into the planting bands will be promoted for those portions of the impervious

perimeter walkway. The pervious pavers will minimize the surface flows to the existing catch basin located at the west end of Penny Lane.

Not including the 5,810 SF of resurfacing of the existing bit. conc. surface north of the Pump Station building, the total proposed impervious surface area here is 12,388 SF.

3. Picnic Shelter Pavilion Area and Water Dept. Parking Lot. – The existing Pavilion will be removed in favor of the creation of the Mariana Yard. The majority of the yard area will be comprised of 8,120 SF of permeable pavers. The far south end of the parking lot green space will be converted into 2,770 SF of impervious bit. conc. surface in support of improving Water Dept. delivery truck circulation and parking opportunities in this area. The south end of the Marina Yard is proposed to be comprised of 2,110 SF of impermeable concrete surface.

The existing catch basin located at the southwest corner of the existing parking lot will be replaced with a deep sump catch basin in support of reducing the sediment load discharges to the lake.

The construction of the concrete pavement at the south end of the Marina yard offsets the existing impervious associated with the Pavilion on this portion of the property. The expansion of the south parking lot surface represents an increase in impervious area to the existing 6,825 SF parking lot. Combined with the proposed 2,770 SF expansion of the lot, the contributory surface area to the proposed deep sump catch basin remains less than the 0.25 acre design threshold set forth in the State's draft Stormwater Manual.



Stormwater Management Plan Pre-Screening

Please provide the following information to the Stormwater Program (stormwater@burlingtonvt.gov, ph: 863-4501) in order to determine what the requirements will be for your project.

- General Information
 - o Project Address:
 - o Owner:
 - o Engineer:
 - o Brief project description:

- Stormwater Management Plan
 - o Impervious¹ change summary

Condition	Type	Total Impervious (s.f.)
Existing Conditions	Existing Impervious	
Proposed	Total Proposed (1+2+3)	
	1) New ²	
	2) Existing to Remain	
	3) Redeveloped	
Net New	Total Proposed – Existing	

If available at this time:

- Existing conditions: *description of existing conditions, description of existing stormwater system, existing drainage issues, current connectivity to City system*

- Proposed Conditions: *description of proposed conditions, brief description of proposed stormwater system, proposed method of discharge to receiving water or City system (overland flow, direct connection via pipe, existing or new manhole or CB)*

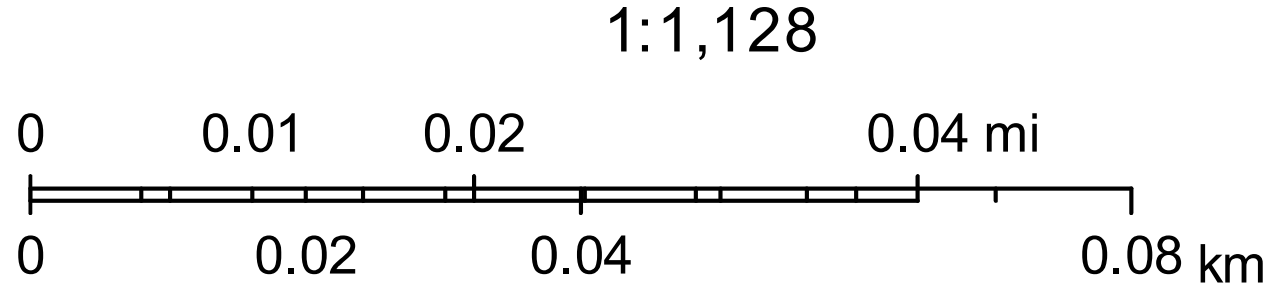
¹ Impervious = any surface off of which water runs off rather than infiltrates, including, but not limited to rooftops and paved/unpaved (gravel/packed dirt) driveways, walkways and patios

² Impervious where there is not currently impervious

CollectionSystem with Street Map



October 31, 2016



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NOTES

1. UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES. EXISTING UTILITY LOCATIONS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL FIELD VERIFY ALL UTILITY CONFLICTS. ALL DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. THE CONTRACTOR SHALL CONTACT DIG SAFE (888-344-7233) PRIOR TO ANY CONSTRUCTION.
2. THIS PLAN IS NOT A BOUNDARY SURVEY AND IS NOT INTENDED TO BE USED AS ONE.
3. PROPERTY LINE INFORMATION IS APPROXIMATE AND BASED ON EXISTING TAX MAP INFORMATION. THIS PLAN IS NOT A BOUNDARY SURVEY AND IS NOT INTENDED TO BE USED AS ONE.

SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
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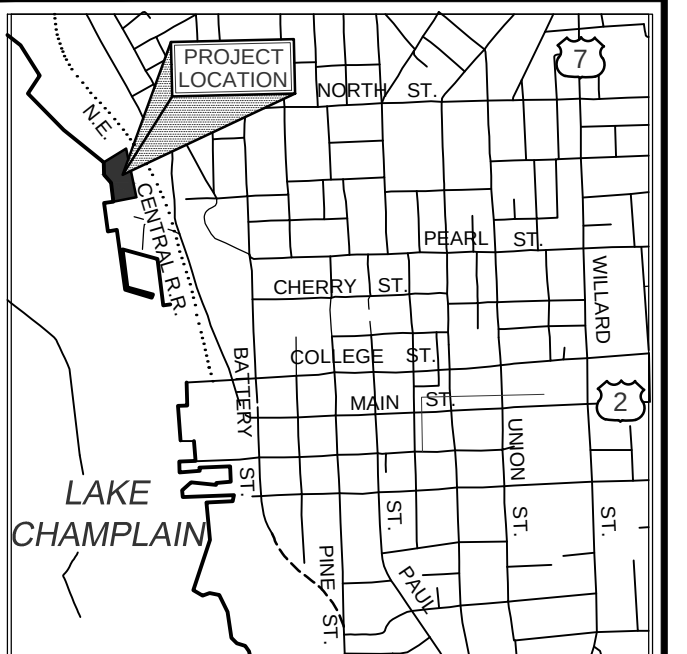
*BURLINGTON
HARBOR MARINA
LLC*

1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

*BURLINGTON
HARBOR MARINA*

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP

$$= 2000'$$
[illegible]

**EXISTING
CONDITIONS
OVERALL SITE
PLAN**

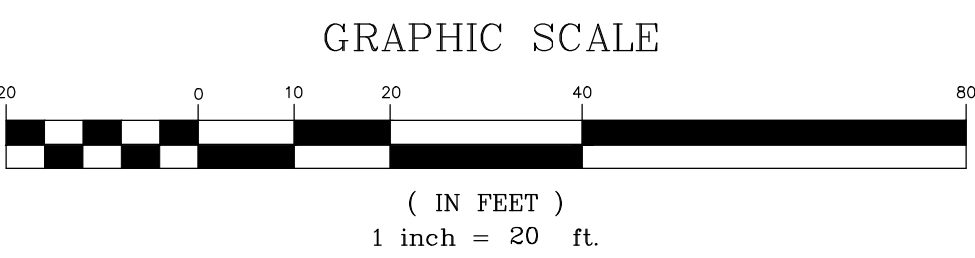
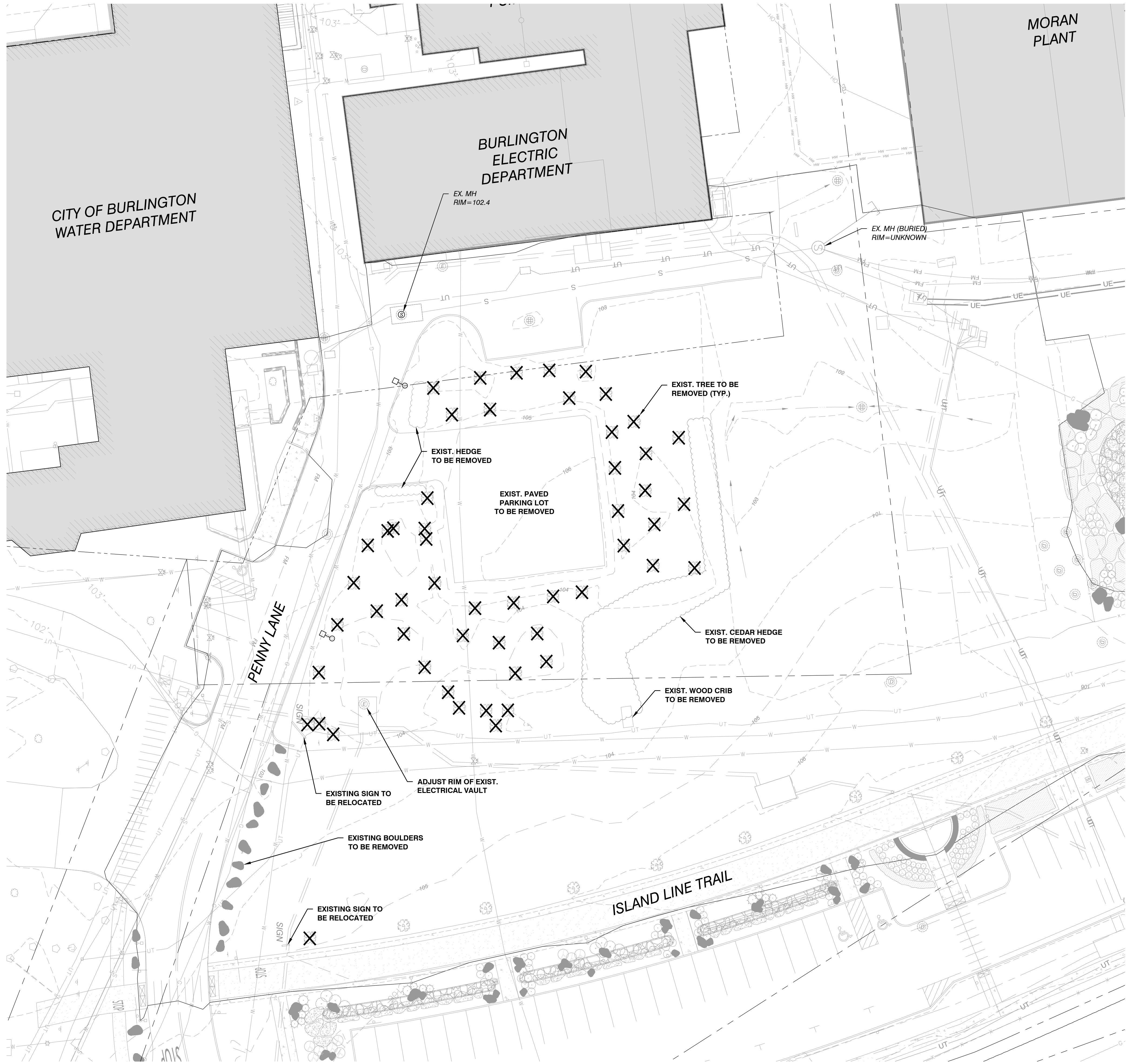
DATE
JAN. 13, 2017

SCALE
1" = 40'

PROJ. NO.
14115

DRAWING NUMBER

C1.0



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PROJECT:

**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

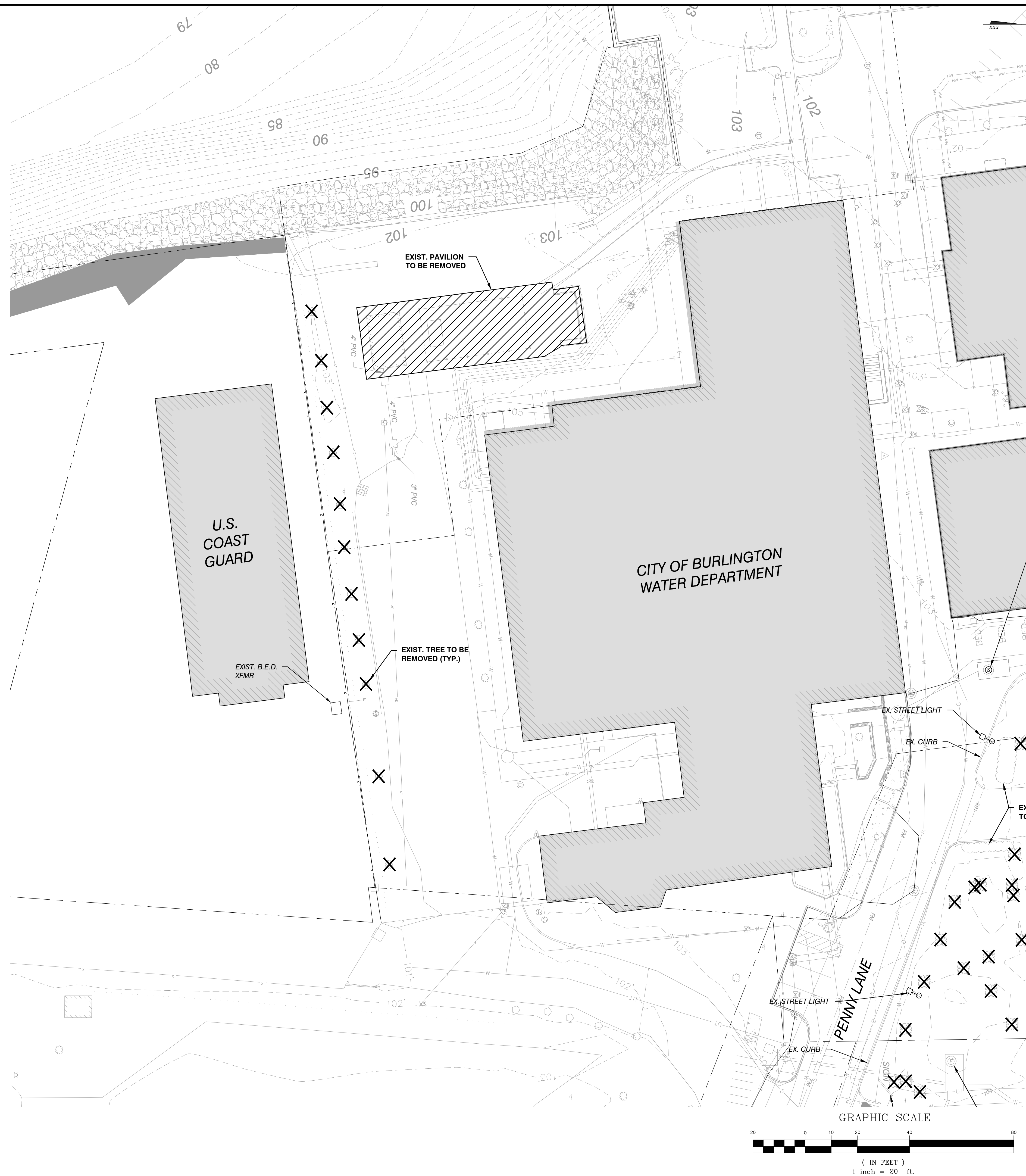
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PARTIAL SITE PLAN**

DATE
JAN. 13, 2017

SCALE
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PROJ. NO.
14115

DRAWING NUMBER
C1.1



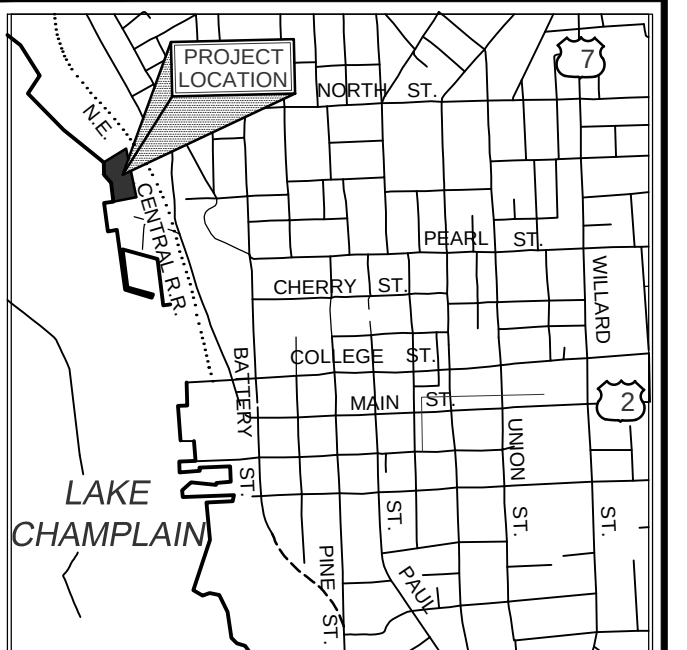
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5

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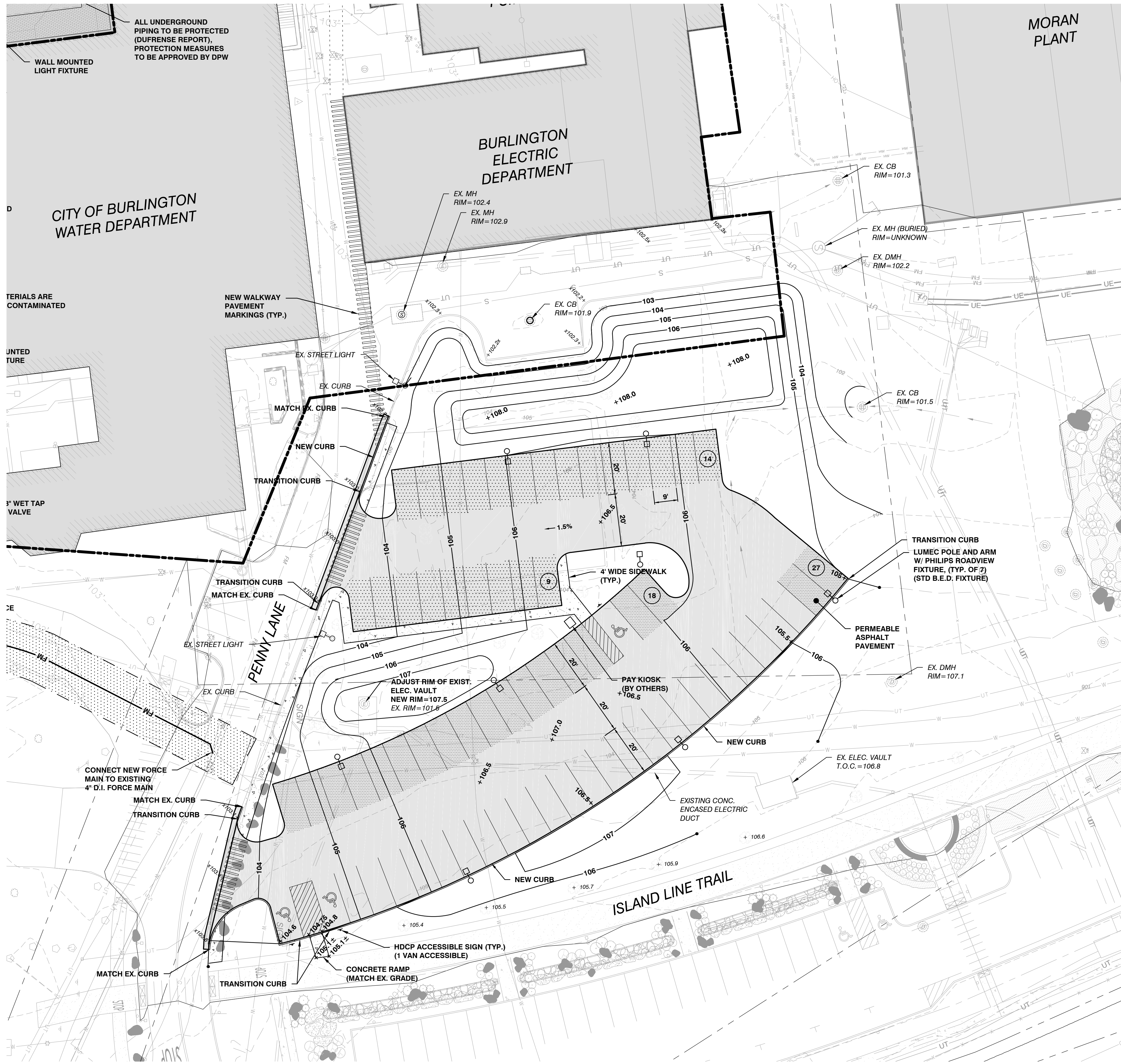
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CONDITIONS
PARTIAL SITE PLAN**

DATE
JAN. 13, 2017

SCALE
1" = 20'

PROJ. NO.
14115

C1.2



OFF STREET PARKING REQUIREMENTS

MARINA	
96 SEASONAL SLIPS (0.5 / SLIP)	48 SPACES
(PER WAIVER)	
MARINA	
EAST LOT	42 SPACES
SOUTH LOT (EMPLOYEE)	4 SPACES
PLAZA LOT (HDCP ACCESS.)	2 SPACES
	48 SPACES
BIKE PARKING	
SHORT TERM (100 USERS x 0.1)	10 SPACES
LONG TERM (1/10) (EMPLOYEE)	1 SPACES
TOTAL REQUIRED	11 SPACES
TOTAL PROVIDED	11 SPACES

WFN (EAST LOT) PARKING SUMMARY

MIN. REQUIRED SPACES
42 MARINA
26 COMMUNITY SAILING CENTER
68 REQUIRED SPACES
68 PROPOSED SPACES
73 PREVIOUSLY PERMITTED SPACES

3 ACCESSIBLE SPACES REQUIRED (TOTAL)
3 ACCESSIBLE SPACES PROVIDED (TOTAL)
1 VAN ACCESSIBLE SPACE REQUIRED
1 VAN ACCESSIBLE SPACES PROVIDED

EAST LOT PARKING RESERVED SPACES

- 23 SPACES FOR EXCLUSIVE MARINA USE
MAY TO OCT.
- 19 SPACES FOR EXCLUSIVE MARINA USE
WEEKENDS AND HOLIDAYS - MAY TO OCT.

SITE ENGINEER:



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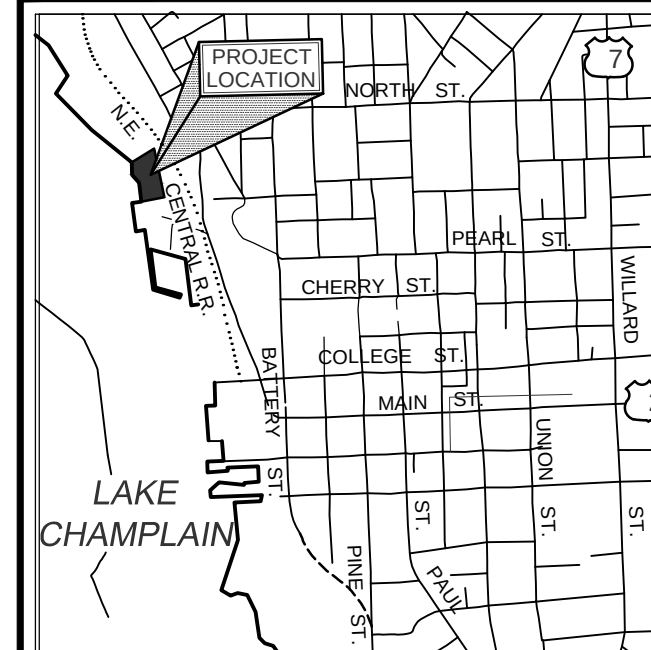
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LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

PROPOSED
CONDITIONS
PARTIAL SITE PLAN

DATE

JAN. 13, 2017

SCALE

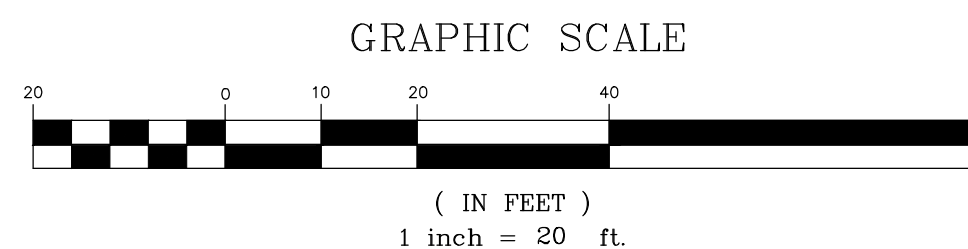
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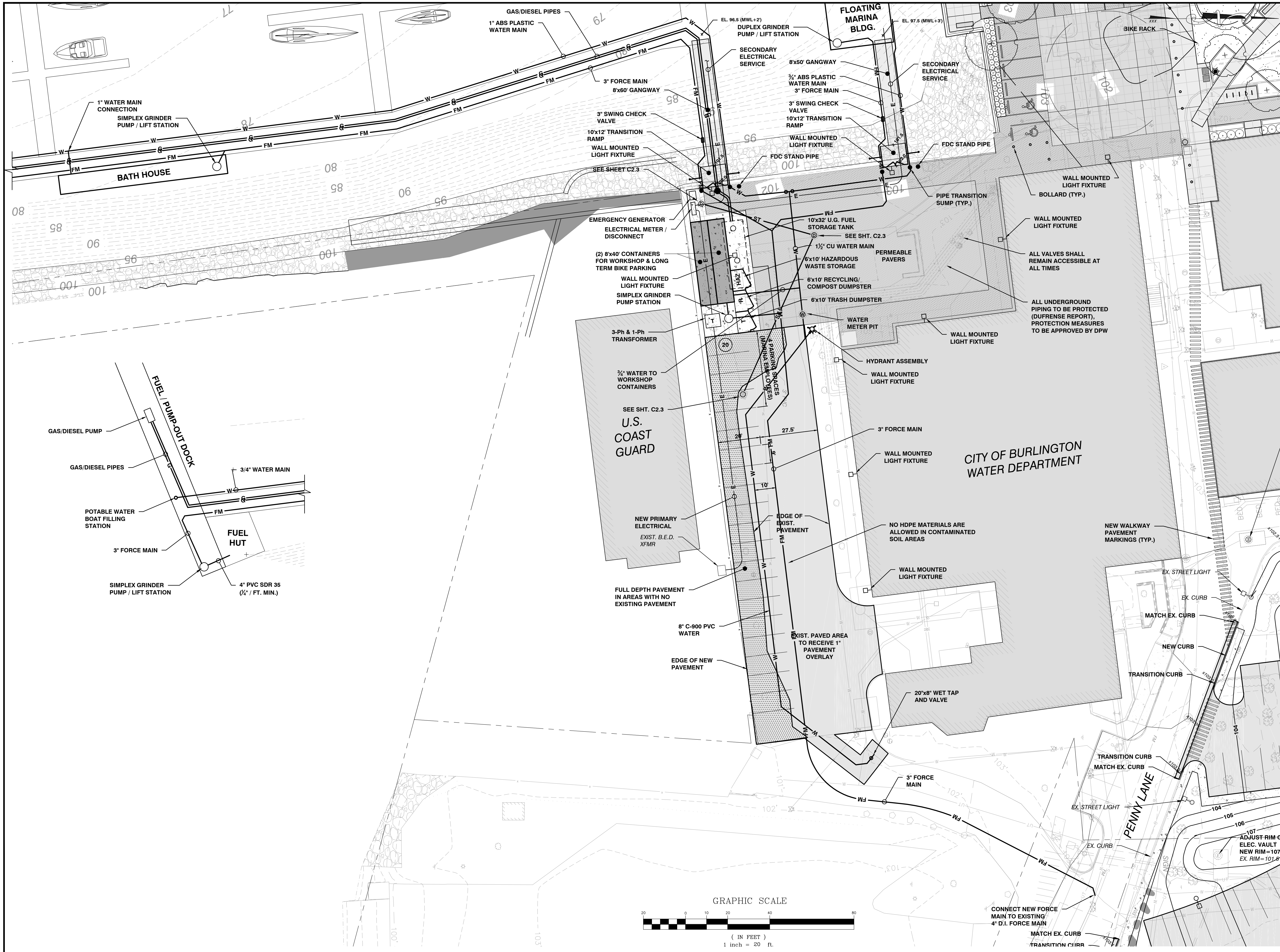
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C2.1





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HARBOR MARINA**

234 PENNY LANE
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LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES

**PROPOSED
CONDITIONS
PARTIAL SITE PLAN**

DATE
JAN. 13, 2017

SCALE

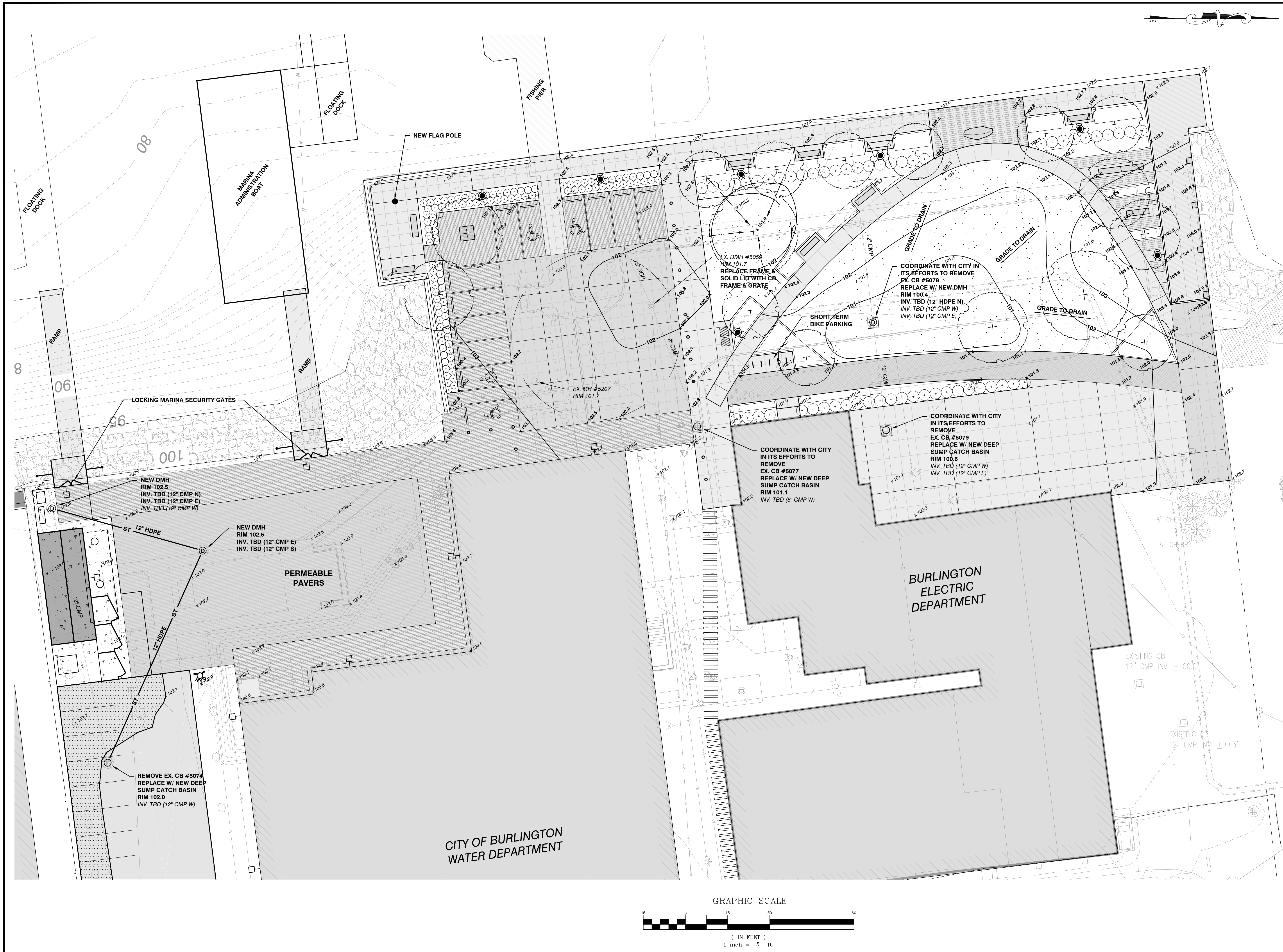
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LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION
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PROPOSED
CONDITIONS
PARTIAL SITE PLAN

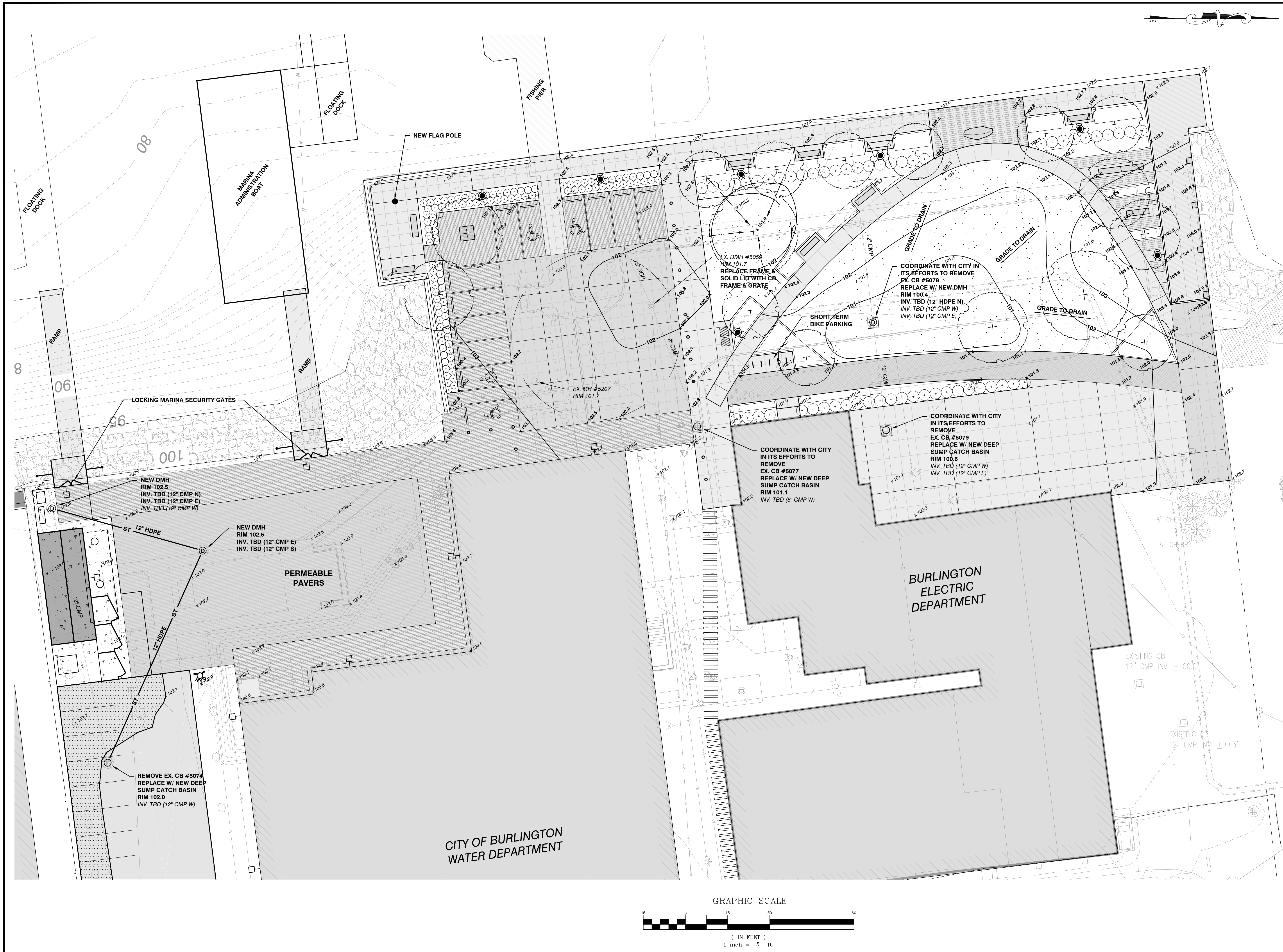
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LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION
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PROPOSED
CONDITIONS
PARTIAL SITE PLAN

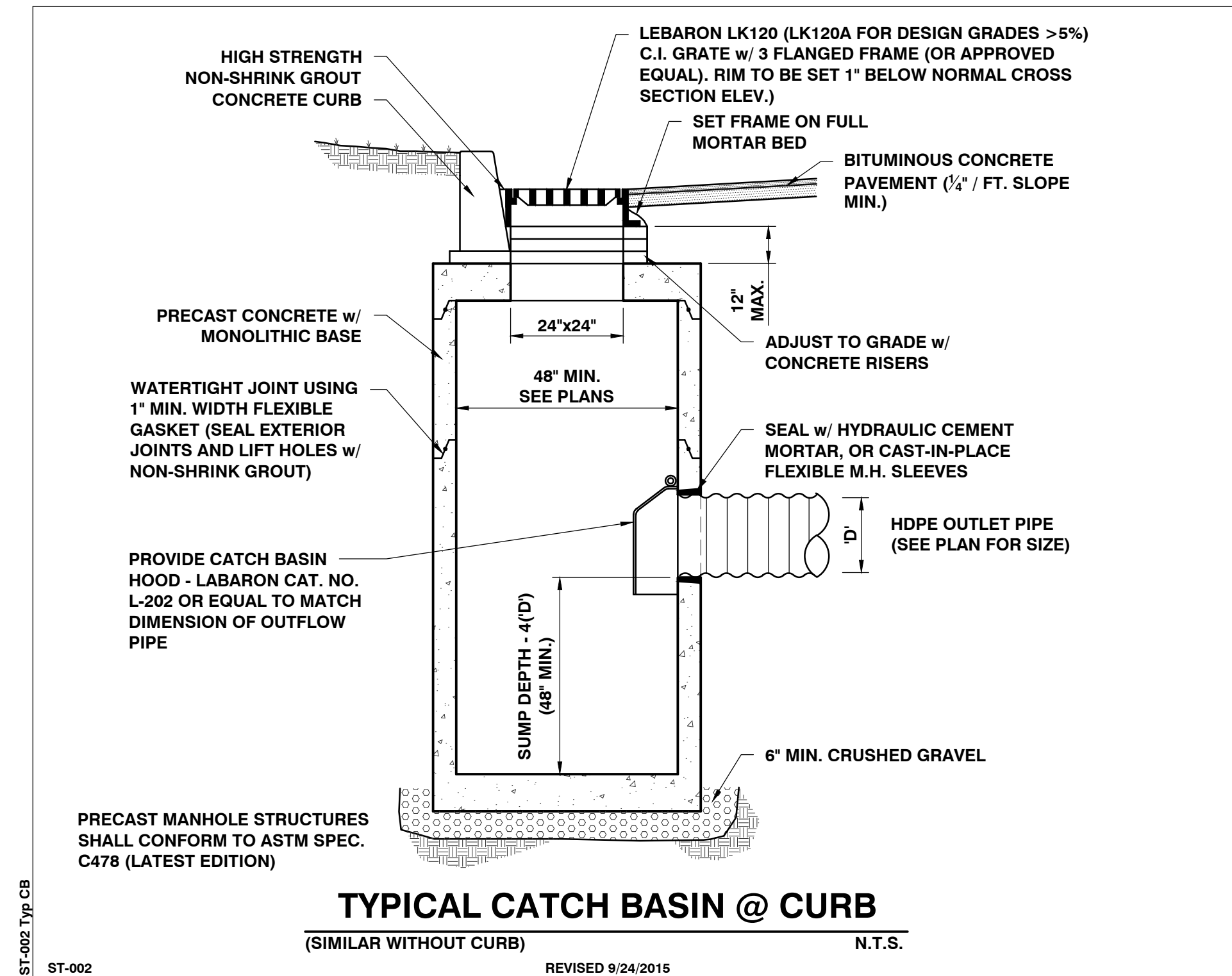
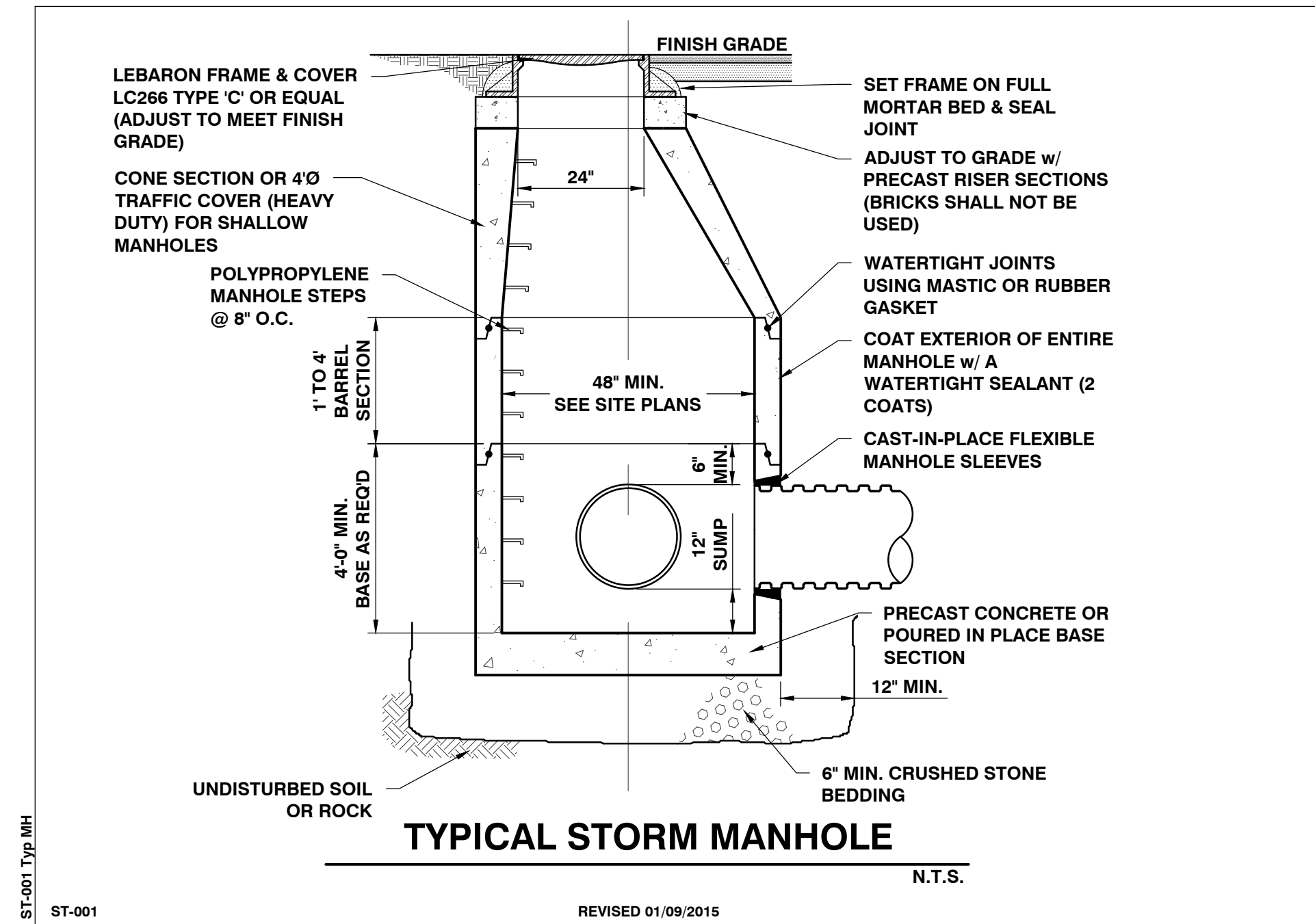
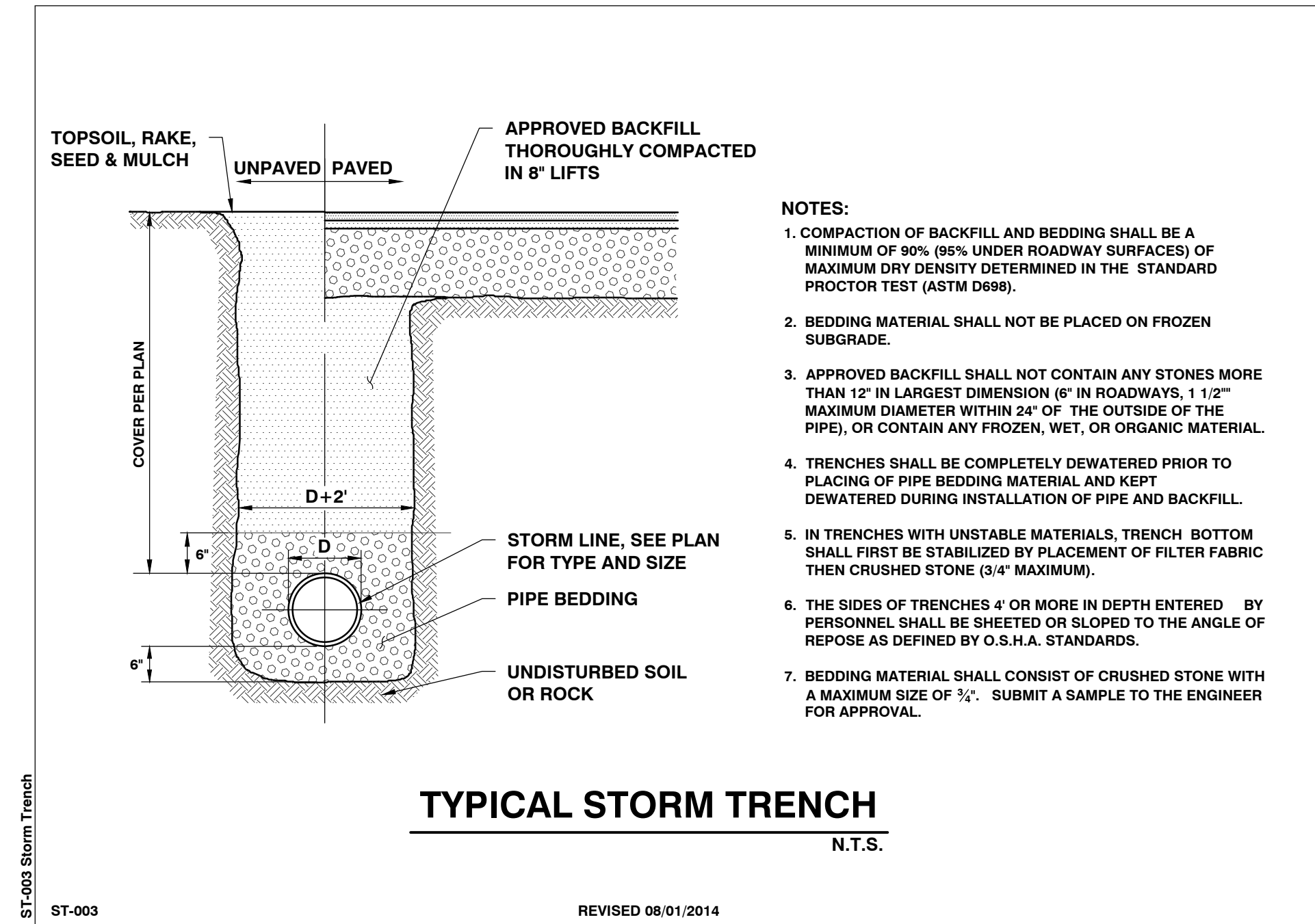
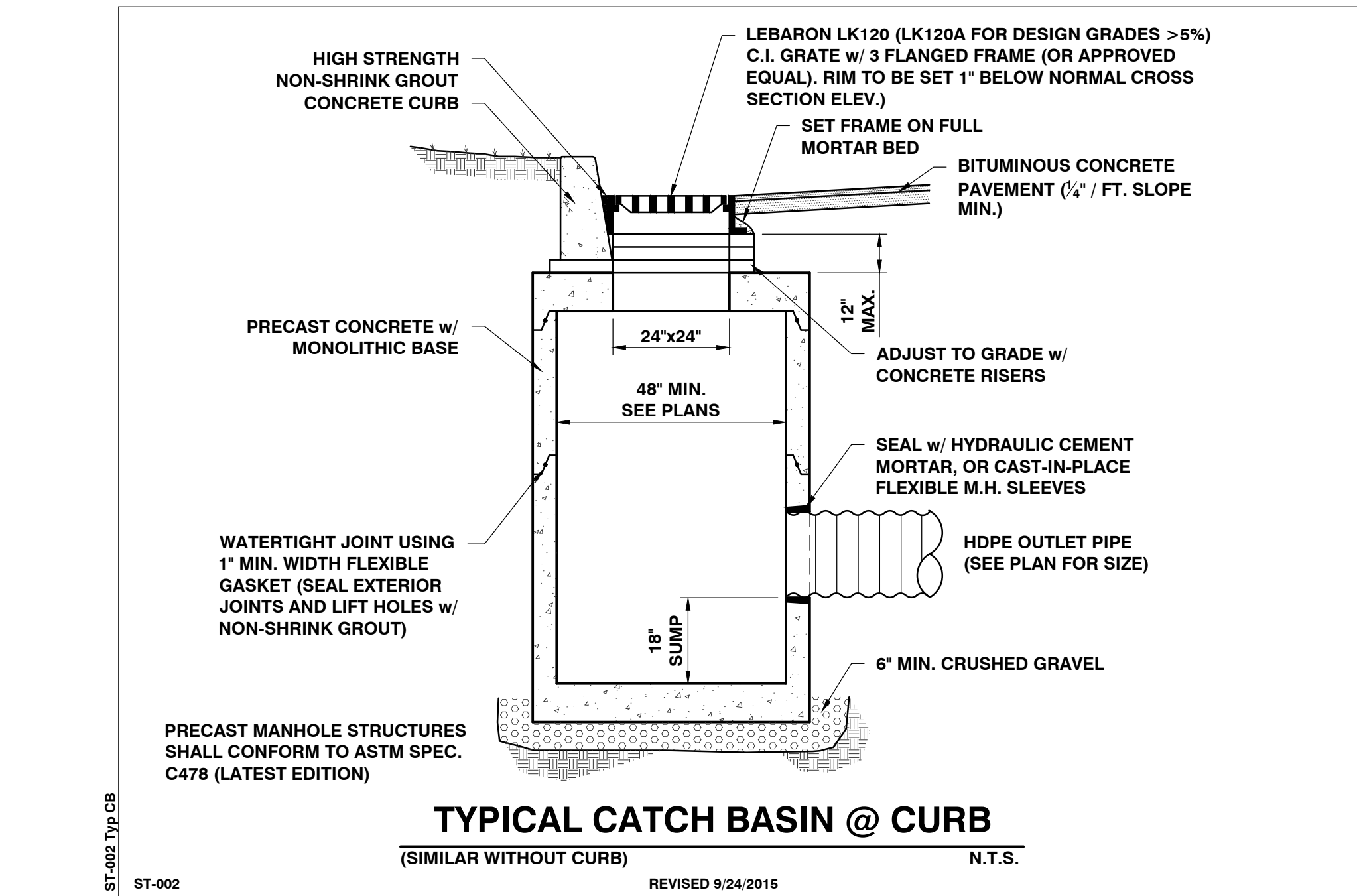
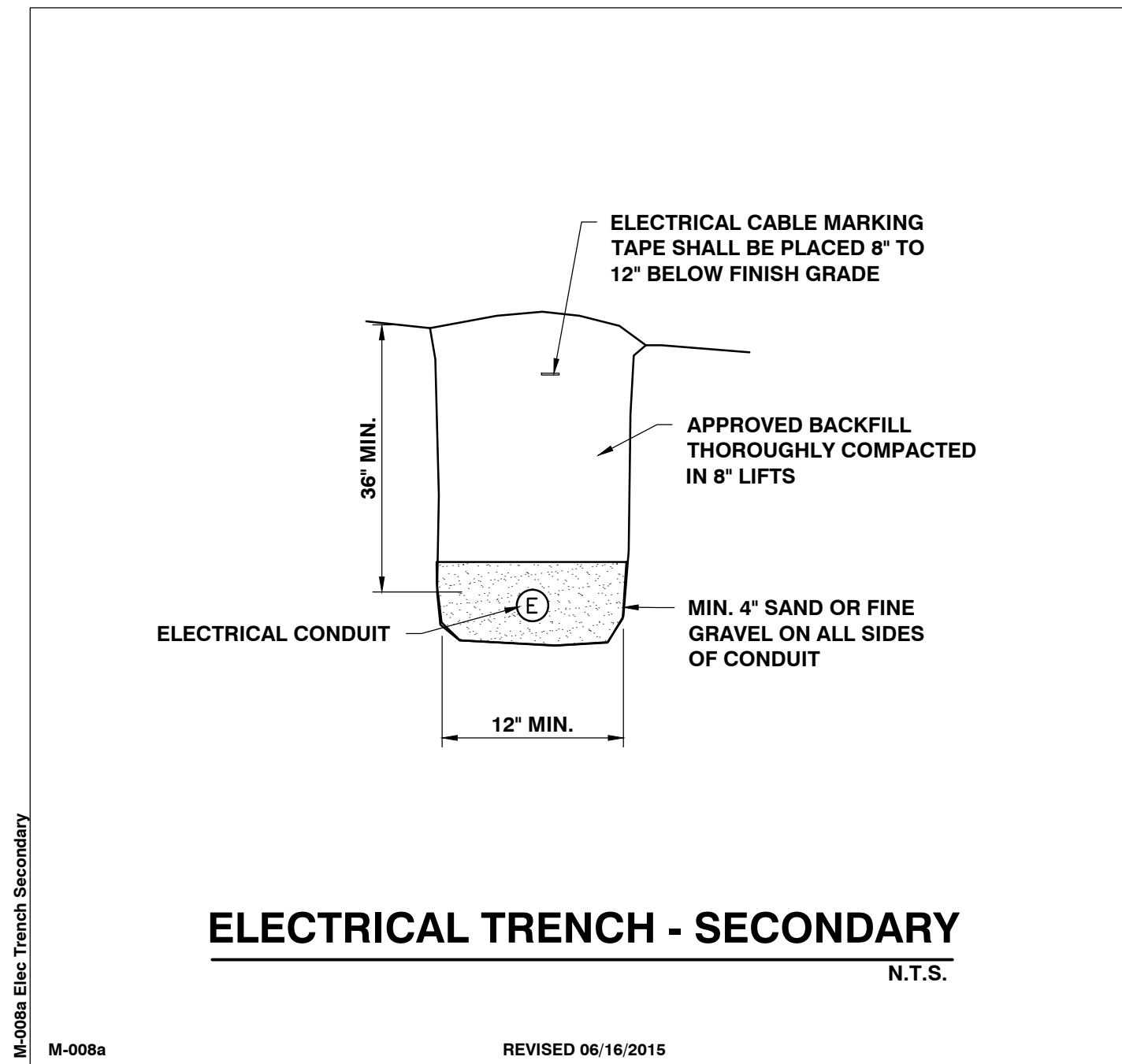
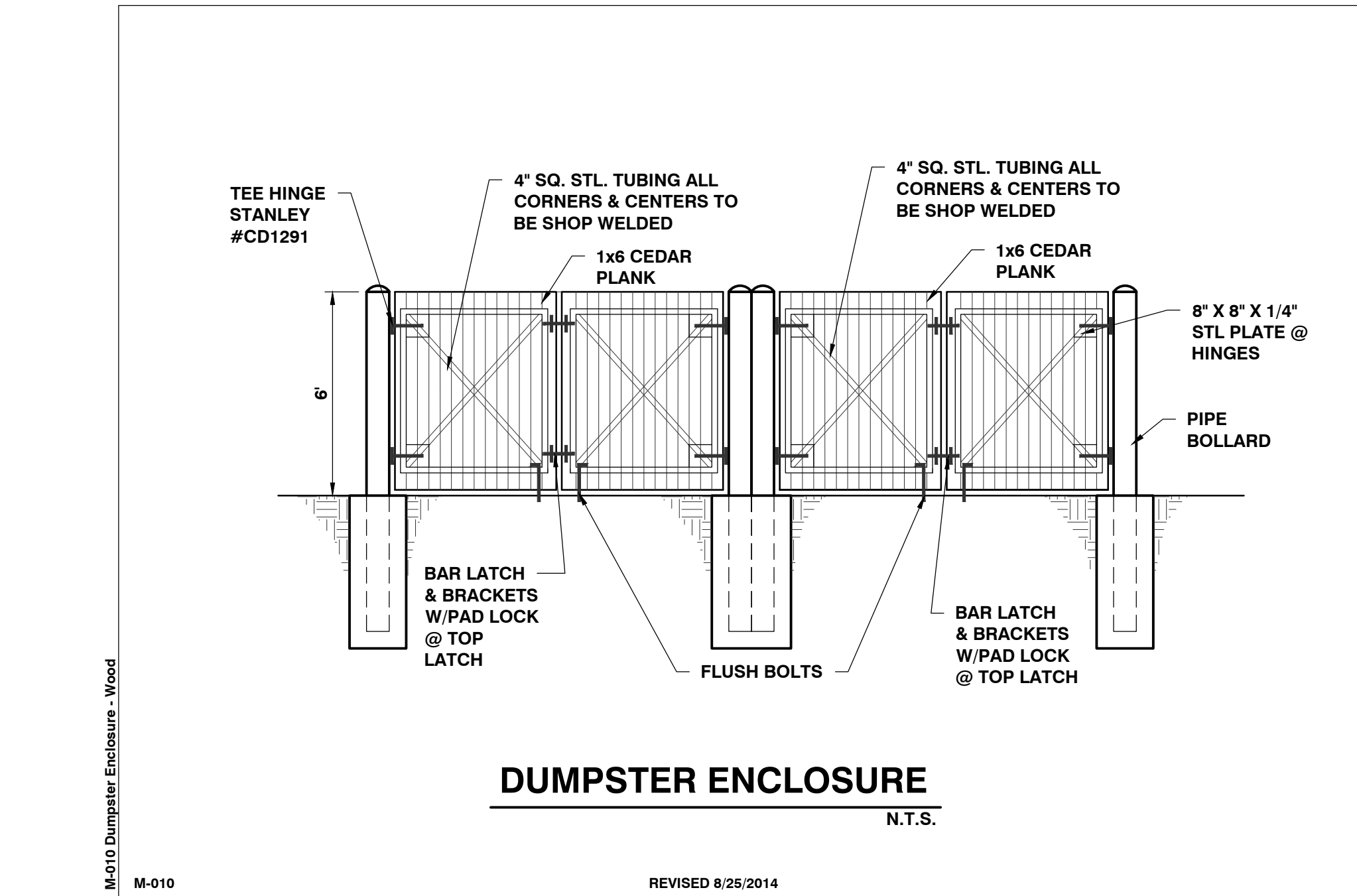
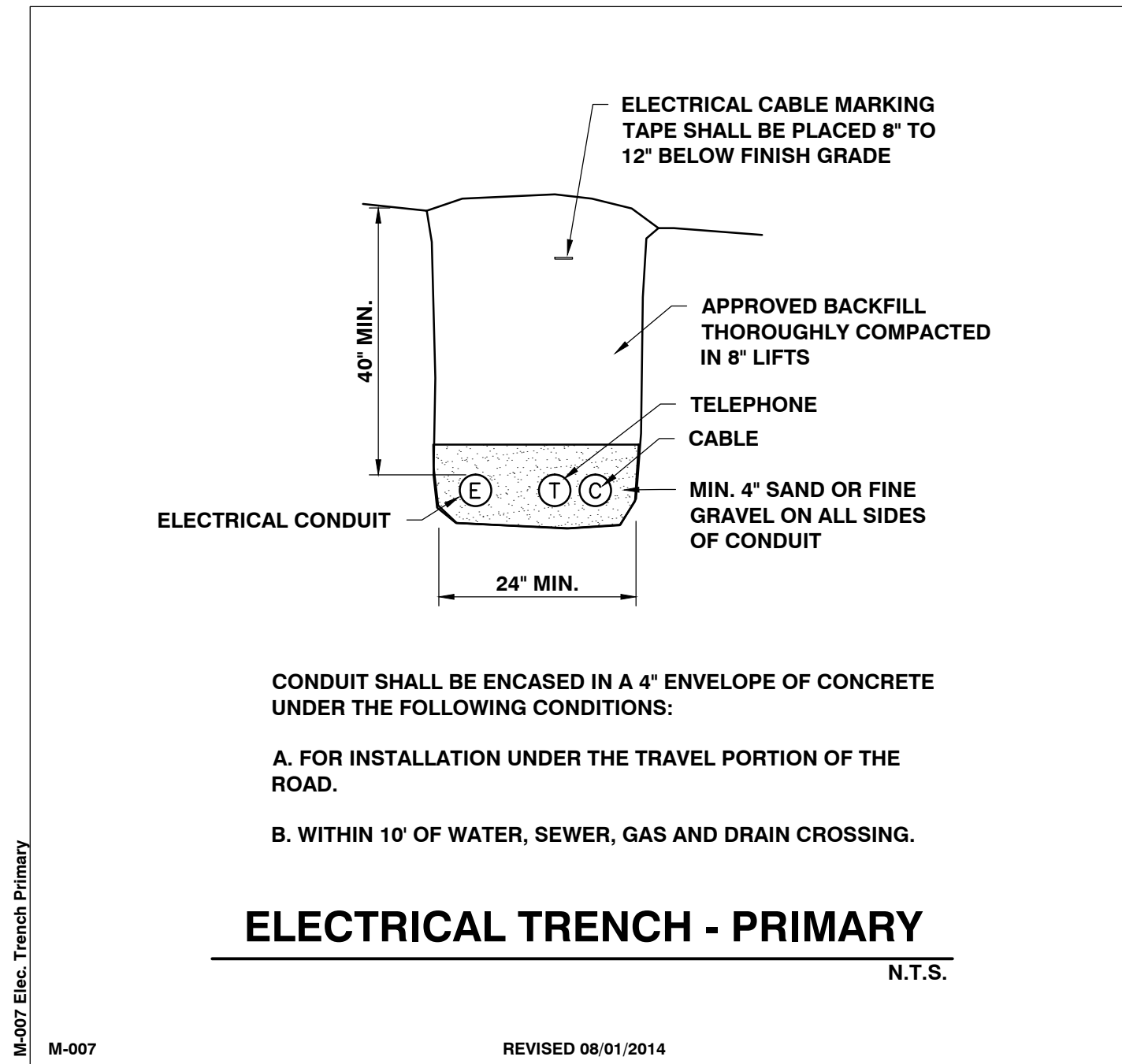
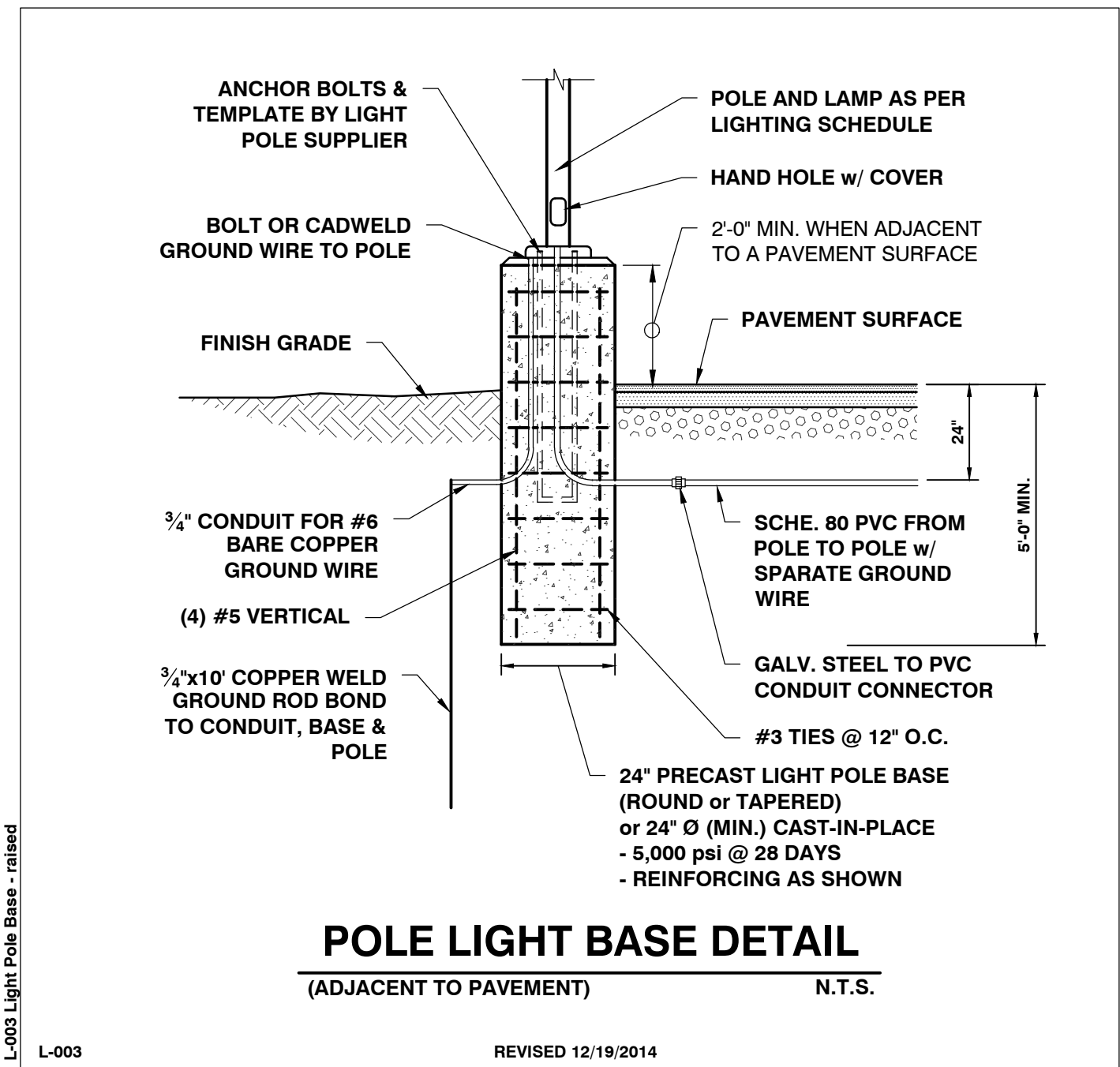
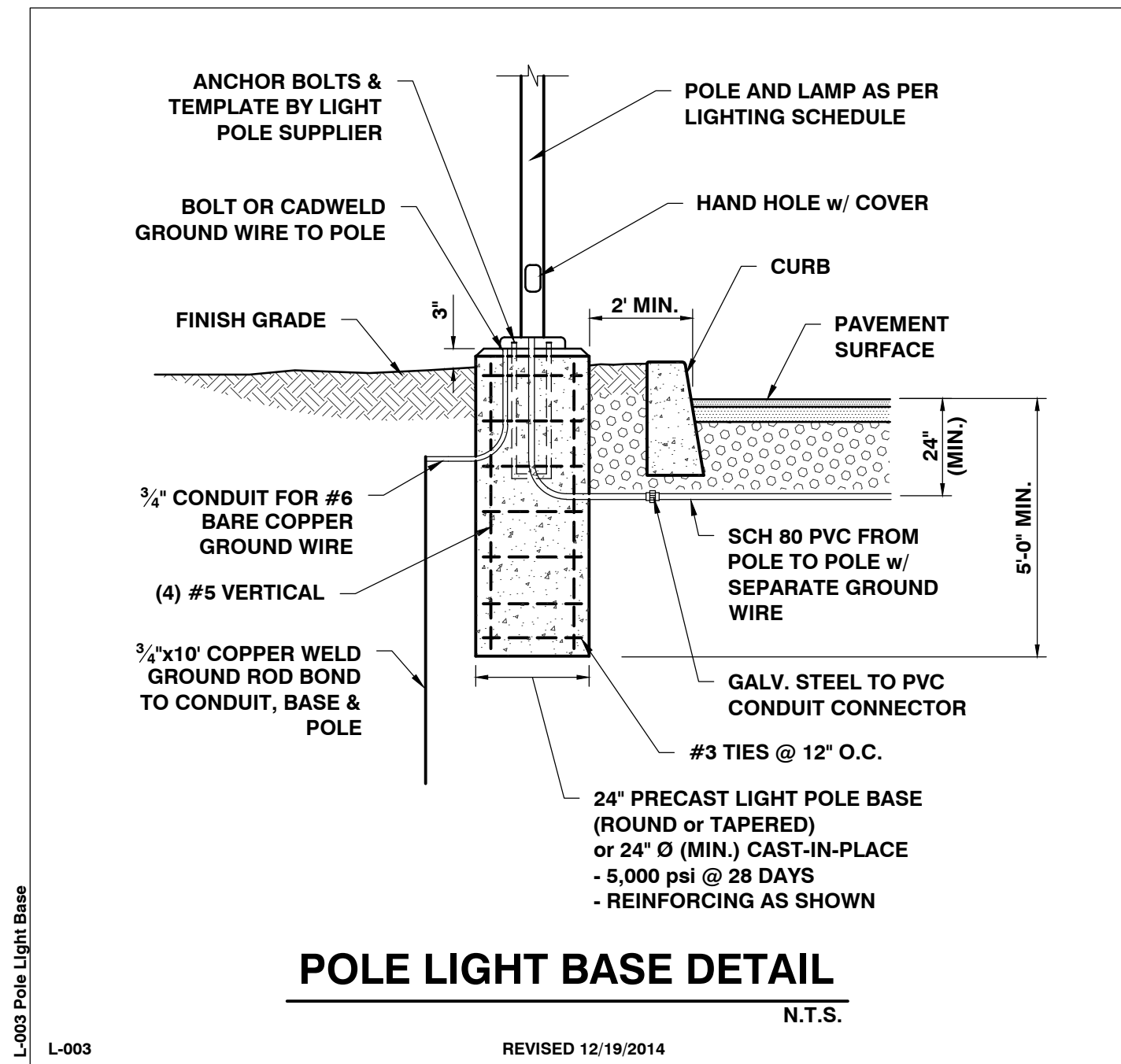
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SCALE
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PROJ. NO.
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1 CHURCH STREET
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PROJECT:

BURLINGTON HARBOR MARINA

234 PENNY LANE
BURLINGTON VT 05401

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DETAILS

DATE
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DRAWING NUMBER
C4.2

UNHSC DESIGN SPECIFICATIONS FOR
POROUS ASPHALT PAVEMENT AND INFILTRATION BEDS

PART 1 GENERAL

1.1 DESCRIPTION

- A. This specification is intended to be used for porous asphalt pavement in parking lot applications. Stormwater management functions of porous asphalt installations include water quality treatment, peak flow reduction, storm volume reduction via groundwater recharge, and increased hydrograph time lag. This specification is intended for a cold climate application based upon the field experience at the UNHSC porous asphalt parking lot located in Durham, New Hampshire, the specification has been adapted for projects in Vermont where the selection of materials and system design reflects local conditions, constraints, and objectives.
- B. The work of this Section includes subgrade preparation, installation of the underlying porous media beds, and porous asphalt mix (mix) design, production, and installation. Porous media beds refer to the material layers underlying the porous asphalt pavement. Porous asphalt pavement refers to the compacted mix of modified asphalt, aggregate, and additives.
- C. The porous asphalt pavement specified herein is modified after the National Asphalt Pavement Association (NAPA) specification outlined in Design, Construction, and Maintenance Guide for Porous Asphalt Pavements, Information Series 131 (2003) and *Design, Construction, and Maintenance of Open-Graded Friction Courses, Information Series 115* (2002).
- D. Alternative specifications for mix, such as Open Graded Friction Courses (OGFC) from Federal Agencies or state Departments of Transportation (DOT), may be used if approved by the Engineer. The primary requirements for the specifications of the mix are performance grade (PG) asphalt binder, binder content, binder draindown, aggregate gradation, air void content, and retained tensile strength (TSR).

1.2 SUBMITTALS

- A. Submit a list of materials proposed for work under this Section including the name and address of the materials producers and the locations from which the materials are to be obtained.
- B. Submit certificates, signed by the materials producers and the relevant subcontractors, stating that materials meet or exceed the specified requirements, for review and approval by the Engineer.
- C. Submit samples of materials for review and approval by the Engineer. For mix materials, samples may be submitted only to the QA inspector with the Engineer's approval.
- D. Submittal requirements for samples and certificates are summarized in Table 1 and discussed in further detail in the Materials section.

1.3 QC/QA

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.
- B. Codes and Standards - All materials, methods of construction and workmanship shall conform to applicable requirements of AASHTO and ASTM Standards or other standards as specified.
- C. QC/QA requirements for production of mix are discussed in the Materials section, and for construction of the porous media beds and paving in the Execution section.

Table 1. Submittal requirements.

Material or Pavement Course*	Properties to be reported on Certificate**
choker course, reservoir course	gradation, max. wash loss, min. durability index, max. abrasion loss, air voids (reservoir course)
filter course	gradation, permeability/ sat. hydraulic conductivity
filter blanket	gradation
geotextile filter fabric	manufacturer's certification, AOS/EOS, tensile strength certificate
stripping paint	POAB certification
binder	gradation, wear, fracture faces (fractured and elongated)
coarse aggregate	gradation.
fine aggregate	gradation.
silicone	manufacturer's certification
Fibers (optional)	manufacturer's certification
mineral filler (optional)	manufacturer's certification
fatty amines (optional anti-strip)	manufacturer's certification
hydrated lime (optional anti-strip)	manufacturer's certification

* Samples of each material shall be submitted to the Engineer (or QA inspector for mix). These samples must be in sufficient volume to perform the standardized tests for each material.
** At a minimum, more material properties may be required (refer to Materials Section).

1.4 PROJECT CONDITIONS

- A. Site Assessment should be performed per the steps outlined in IS 131 (NAPA, 2003).
- B. Construction Phasing should be performed as outlined in *IS 131* (NAPA, 2003).
- C. Protection of Existing Improvements
- Protect adjacent work from the unintended dispersal/splashing of pavement materials. Remove all stains from exposed surfaces of pavement, structures, and grounds. Remove all waste and spillage. If necessary, limit access to adjacent work/structures with appropriate signage and/or barriers.
 - Proper erosion and sediment control practices shall be provided in accordance with existing regulations. Do not damage or disturb existing improvements or vegetation. Provide suitable protection where required before starting work and maintain protection throughout the course of the work. This includes the regular, appropriate inspection and maintenance of the erosion and sediment control measures.
 - Restore damaged areas, including existing pavement on or adjacent to the site that has been damaged as a result of construction work, to their original condition or repair as directed to the satisfaction of the Engineer at no additional cost.
- D. Safety and Traffic Control
- Notify and cooperate with local authorities and other organizations having jurisdiction when construction work will interfere with existing roads and traffic.
 - Provide temporary barriers, signs, warning lights, flaggers, and other protections as required to assure the safety of persons and vehicles around and within the construction area and to organize the smooth flow of traffic.

E. Weather Limitations

- Porous asphalt, Open graded friction course, or dense-mixed asphalt shall not be placed between November 15 and March 15, or when the ambient air temperature at the pavement site in the shade away from artificial heat is below 16 °C (60 °F) or when the actual ground temperature is below 10 °C (50 °F). Only the Engineer may adjust the air temperature requirement or extend the dates of the pavement season.
- The Contractor shall not pave on days when rain is forecast for the day, unless a change in the weather results in favorable conditions as determined by the Engineer.

1.5 REFERENCES

- A. *General Porous Asphalt Bituminous Paving and Groundwater Infiltration Beds*, specification by UNH Stormwater Center, February, 2005.
- B. *Design, Construction, and Maintenance Guide for Porous Asphalt Pavements, Information Series 131*, National Asphalt Pavement Association (NAPA), 2003.
- C. *Design, Construction, and Maintenance of Open-Graded Friction Courses, information Series 115*, NAPA, 2002.
- D. *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.
- E. *Standards of the American Association of State Highway and Transportation Officials* (AASHTO), 1998 or latest edition.
- F. *Section 401- Plant Mix Pavements - General, in Standard Specifications for Road and Bridge Construction - State of New Hampshire Department of Transportation*, 2006.
- G. *Section 02725 - General Porous Pavement and Groundwater Infiltration Beds*, specification from NAPA Porous Asphalt Seminar handout, Cahill Associates, Inc., 2004.
- H. *Correlations of Permeability and Grain Size*, Russell G. Shepherd, Groundwater 27 (5), 1989. I. Groundwater, R. Allan Freeze and John A. Cherry, 1979.
- I. *Groundwater*, R. Allan Freeze and John A. Cherry, 1979.

PART 2 PRODUCTS

2.1 MATERIALS

A. Porous Media Infiltration Beds

Below the porous asphalt itself are located the porous media infiltration beds (Figure 1), from top to bottom: a 4" – 8" (10 - 20 cm) (minimum) thick layer of choker course of crushed stone (8" is preferable to alleviate compaction issues with the porous asphalt); an 8" to 12" (20 cm to 30 cm) minimum thickness layer of filter course of poorly graded sand (a.k.a. bankrun gravel or modified 304.1); 3" (8 cm) minimum thickness filter blanket that is an intermediate setting bed (pea gravel); and a reservoir course of crushed stone, thickness dependant on required storage and underlying native materials. Alternatively, the pea gravel layer could be thickened and used as the reservoir course depending upon subsoil suitability. This alternative simplifies subbase construction. For lower permeability native soils, perforated or slotted drain pipe is located in the stone reservoir course for drainage. This drain pipe can be daylighted to receiving waters or connected into other stormwater management infrastructure (wetland, storm sewer, etc.). The fine gradation of the filter course is for enhanced filtration and delayed infiltration. The high air void content of the uniformly graded crushed stone reservoir course: maximizes storage of infiltrated water thereby allowing more time for water to infiltrate between storms; and creates a capillary barrier that arrests vertical water movement and in doing so prevents winter freeze-thaw and heaving. The filter blanket is placed to prevent downward migration of filter course material into the reservoir course. The optional underdrain in the reservoir course is for hydraulic relief (typically raised off of the bottom of the reservoir stone layer for enhanced groundwater recharge). Nonwoven geotextile filter fabric (geotextile) is used only for stabilizing the sloping sides of the porous asphalt system excavation and not to be used on the bottom of the system unless needed for structural reasons.

1. Choker Course

Material for the choker course and reservoir course shall meet the following:

Maximum Wash Loss of 0.5%
Minimum Durability Index of 35
Maximum Abrasion Loss of 10% for 100 revolutions, and maximum of 50% for 500 revolutions.

Material for the choker course and reservoir course shall have the AASHTO No. 57 and AASHTO No. 3 gradations, respectively, as specified in Table 2. If the AASHTO No. 3 gradation cannot be met, AASHTO No. 5 is acceptable with approval of the Engineer. AASHTO no. 3 is also suitable for the choker course.

2. Filter course material

Filter course material shall have a hydraulic conductivity (also referred to as coefficient of permeability) of 10 to 60 ft/day at 95% standard proctor compaction unless otherwise approved by the Engineer. Great care needs to be used to not over compact materials. Overcompaction results with loss of infiltration capacity. The filter course material is commonly referred to as a bankrun gravel (modified NHDOT 304.1). In order to select an appropriate gradation, coefficient of permeability may be estimated through an equation that relates gradation to permeability, such as described in Correlations of Permeability and Grain Size (Shepherd, 1989) or in Section 8.7 Estimation of Saturated Hydraulic Conductivity (Freeze and Cherry, 1979). The hydraulic conductivity should be determined by ASTM D2434 and reported to the Engineer.

3. Filter blanket material

Filter blanket material between the filter course and the reservoir course shall be an intermediate size between the finer filter course above, and the coarser reservoir course below, for the purpose of preventing the migration of a fine setting bed into the coarser reservoir material. An acceptable gradation shall be calculated based on selected gradations of the filter course and reservoir course using criteria outlined in the HEC 11 (Brown and Clyde, 1989). A pea-gravel with a median particle diameter of 3/8" (9.5 mm) is commonplace.

4. Reservoir Course

Reservoir course thickness is dependent upon the following criteria (that vary from site to site):

- A 4" (10 cm) minimum thickness of reservoir course acts as a capillary barrier for frost heave protection. The reservoir course is located at the interface between subbase and native materials.
- 4-in. (10 cm) minimum thickness if the underlying native materials are either well drained (Hydrologic Group A soils).
- 8-in. (30 cm) minimum thickness if subdrains are installed. Subdrains insure that the subbase is well drained

- Subdrains, if included, are elevated a minimum of 4" (10 cm) from the reservoir course bottom to provide storage and infiltration for the water quality volume. If the system is lined,

- Subbase thickness is determined from subbase materials having sufficient void space to store the design storm,

Example: If the 25-year storm is 5.1" (13 cm) of rainfall depth, and the reservoir void space is 30%, then the minimum subbase thickness = 5.1"/0.3 = 17" (43.2 cm).

- Favement system and subbase thickness are > 0.65 * design frost depth for area.

Example: Durham, New Hampshire, 48" (122 cm) = D_{maximum frost}, therefore the minimum depth to the bottom of the subbase = 0.65(48") = 32" (81 cm).

Table 2. Gradations and compaction of choker, filter, and reservoir course materials.

US Standard Sieve Size Inches/mm	Percent Passing (%)			
	Choker Course (AASHTO No. 57)	Filter Course (Modified NHDOT 304.1)	Reservoir Course (AASHTO No. 3)	Reservoir Course Alternative* (AASHTO No. 5)
6/150	-	100	-	-
2 1/2/63	-	-	100	-
2/50	-	-	90 – 100	-
1 1/2/37.5	100	-	35 – 70	100
1/25	95 - 100	-	0 – 15	90 – 100
3/4/19	-	-	-	20 - 55
5/8/9.5	25 - 60	-	0 - 5	0 - 10
#4/4.75	0 - 10	70-100	-	0 - 5
#8/2.36	0 - 5	-	-	-
#300/0.075	-	0 – 6**	-	-
% Compaction ASTM D698 / AASHTO T99	95	95	95	95

* Alternate gradations (e.g. AASHTO No. 5) may be accepted upon Engineer's approval.
** Preferably less than 4% fines

5. Non-woven geotextile filter fabric

Filter fabric is only recommended for the sloping sides of the porous asphalt system excavation. It shall be Mirafi 160N, or approved equal and shall conform to the specifications in Table 3. Mirafi ® 160N is a non-woven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. 160N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

6. Alternative Applications and Residential Driveways.

The recommendations above are based on a commercial parking application for both traffic and contaminant load. Alternative applications such as residential driveways and low use applications may justify the use of alternative subbase thicknesses for the porous media beds, filter blanket, and geotextiles. Residential driveway applications have been designed with a subbase limited to only an 8" compacted choker course. Variations should consider structural load requirements for material thickness, and contaminant load for filter course thickness. A reduced total system thickness (Section 2.1.3.f) will subject the pavement to greater freeze thaw susceptibility.

Table 3. Non-woven geotextile filter fabric properties.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Values	
			MD*	CD**
Grab Tensile Strength	ASTM D 4632	kN (lbs)	0.71 (160)	0.71 (160)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Shear Strength	ASTM D 4533	kN (lbs)	0.27 (60)	0.27 (60)
Multi-Point Burst Strength	ASTM D 3786	kPa (psi)	2100 (305)	2100 (305)
Puncture Strength	ASTM D 4833	kN (lbs)	0.42 (95)	0.42 (95)
Apparent Opening Size (AOS)	ASTM D 4751	mm (US Sieve)	0.212 (70)	0.212 (70)
Permeability	ASTM D 4491	sec ⁻¹	1.4	1.4
Permeability	ASTM D 4491	cm/sec	0.22	0.22
Flow Rate	ASTM D 4491	lpm/m ² (gpm/ft ²)	4.477 (110)	4.477 (110)
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m ² (oz/yd ²)	217 (6.4)
Thickness	ASTM D 5199	mm (inches)	1.9 (75)
Roll dimension (width x length)		m (ft)	4.5 x 91 (15 x 300)
Roll area		m ² (yd ²)	410 (500)
Estimated roll weight		kg (lb)	99 (217)

*MD - Machine Direction; **CD - Cross-machine Direction

B. Porous Asphalt Mix

1. Mix materials

Mix materials consist of modified performance grade asphalt binder (PGAB), coarse and fine aggregates, and optional additives such as silicone, fibers, mineral fillers, fatty amines, and hydrated lime. Materials shall meet the requirements of the NAPA's Design, Construction, and Maintenance of Open-Graded Friction Courses, Information Series 115 (2002), except where noted otherwise below or approved in writing by the Engineer.

2. Polymer Modified PGAB and Mix Designs.

The asphalt binder shall be a polymer and/or fiber modified Performance Graded asphalt binder (PGAB) used in the production of Superpave Hot Mix Asphalt (HMA) mixtures. Ideally for maximum durability, the PGAB shall be two grades stiffer than that required for dense mix asphalt(DMA) parking lot installations, which is often achieved by adding a polymer and/or fiber. Mix designs will meet or exceed criteria listed in Table 5

The PGAB polymer modifiers are to be either styrene butadiene rubber (SBR) or styrene butadiene styrene (SBS). SBS is typically reserved for large projects as terminal pre-blending is required. SBR is feasible for smaller projects as it can be blended at the plant or terminal blended. The quantity of rubber solids in the SBR shall typically be 1.5-3% by weight of the bitumen content of the mix.

The dosage of fiber additives shall be either 0.3 percent cellulose fibers or 0.4 percent mineral fibers by total mixture mass. Fibers are a simple addition either manually for a batch plant or automated for larger drum plants. The binder shall meet the requirements of AASHTO M320.

The PGAB may be pre-blended or post-blended. The pre-blended binder can be pre-blended at the source or at a terminal. For post-blended addition, the modifier can either be in-line blended or injected into the pugmill at the plant.

Table 4. Post-Blended SBR Binder QC Plan requirements.

The QC Plan will contain:

- Company name and address
- Plant location and address
- Type of Facility
- Contact information for the Quality Control Plan Administrator
- QC Tests to be performed on each PGAB
- Name(s) of QC Testing Lab to perform QC and Process Control testing.
- Actions to be taken for PG Binders and SBR in Non compliance
- List of mechanical controls (requirements below)
- List of process controls and documentation (requirements below)

List of Mechanical Controls

- Liquid SBR no-flow alert system with an "alert" located in the control room and automatic documentation of a no flow situation on the printout
- Provide means of calibrating the liquid SBR metering system to a delivery tolerance of 1%
- A batching tolerance at the end of each day's production must be within 0.5% of the amount of SBR solids specified.
- Mag-flow meter (other metering system may be considered)
- Method of sampling liquid SBR.

List of Process Controls and Documentation

- Printouts of liquid SBR and PG binder quantities must be synchronized within one minute of each other
- SBR supplier certification showing the percent of SBR solids in liquid SBR
- Test results of a lab sample blended with the specified dosage of SBR. At a minimum, provide the name of the PGAB and liquid SBR suppliers, and PGAB information such as grade and lot number, and SBR product name used for the sample.
- MSDS sheet for liquid SBR.
- Handling, storage, and usage requirements will be followed as required by the liquid SBR manufacturer
- At a minimum, provide a table showing proposed rate of SBR liquid (L/min.) in relation to HMA production rate (tons per hour, TPH) for the % solids in liquid SBR, quantity of SBR specified for HMA production, and the specific gravity of the SBR.
- QCT or QC Plan Administrator must be responsible for documenting quantities, ensuring actual use is within tolerance, etc. All printouts, calculations, supplier certifications etc. must be filed and retained as part of the QCT's daily diary/reports.
- Method and frequency of testing at the HMA plant, including initial testing and specification testing.

*This Plan shall be submitted to the Engineer 10 days before production.

3. Anti-Stripping Mix Additives.

The mix shall be tested for moisture susceptibility and asphalt stripping from the aggregate by AASHTO T283. If the retained tensile strength (TSR) < 80% upon testing, a heat stable additive shall be furnished to improve the anti-stripping properties of the asphalt binder. Test with one freeze-thaw cycle (rather than five recommended in NAPA IS 115). The amount and type of additive (e.g. fatty amines or hydrated lime) to be used shall be based on the manufacturer's recommendations, the mix design test results, and shall be approved by the Engineer.

4. Coarse Aggregate.

Coarse aggregate shall be that part of the aggregate retained on the No. 8 sieve; it shall consist of clean, tough, durable fragments of crushed stone, or crushed gravel of uniform quality throughout. Coarse aggregate shall be crushed stone or crushed gravel and shall have a percentage of wear as determined by AASHTO T96 of not more than 40 percent. In the mixture, at least 75 percent, by mass (weight), of the material coarser than the 4.75 mm (No. 4) sieve shall have at least two fractured faces, and 90 percent shall have one or more fractured faces (ASTM D5821). Coarse aggregate shall be free from clay balls, organic matter, deleterious substances, and a not more than 8.0% of flat or elongated pieces (>3:1) as specified in ASTM D4791.

5. Fine Aggregate.

The fine aggregate shall be that part of the aggregate mixture passing the No. 8 sieve and shall consist of sand, screenings, or combination thereof with uniform quality throughout. Fine aggregate shall consist of durable particles, free from injurious foreign matter. Screenings shall be of the same or similar materials as specified for coarse aggregate. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6 when tested in accordance with AASHTO T90. Fine aggregate from the total mixture shall meet plasticity requirements.

6. Porous Asphalt Mix Design Criteria.

The Contractor shall submit a mix design at least 10 working days prior to the beginning of production. The Contractor shall make available samples of coarse aggregate, fine aggregate, mineral filler, fibers and a sample of the PGAB that will be used in the design of the mixture. A certificate of analysis (COA) of the PGAB will be submitted with the mix design. The COA will be certified by a laboratory meeting the requirements of AASHTO R18. The Laboratory will be certified by the state DOT, regional equivalent (e.g. NETTCP), and/or qualified under ASTM D3666. Technicians will be certified by the regional certification agency (e.g. NETTCP) in the discipline of HMA Plant Technician.

Bulk specific gravity (SG) used in air void content calculations shall not be determined and results will not be accepted using AASHTO T166 (saturated surface dry), since it is not intended for open graded specimens (>10% AV). Bulk SG shall be calculated using AASHTO T275 (paraffin wax) or ASTM D6752 (automatic vacuum sealing, e.g. CoreLok). Air void content shall be calculated from the bulk SG and maximum theoretical SG (AASHTO T209) using ASTM D3203.

The materials shall be combined and graded to meet the composition limits by mass (weight) as shown in Table 5.

Table 5: Porous Asphalt Mix Design Criteria.

Sieve Size (inch/mm)	Percent Passing (%)
0.75/19	100
0.50/12.5	85-100
0.375/9.5	55-75
No.4/4.75	10-25
No.8/2.36	5-10
No.20/0.075 (#200)	2-4
Binder Content (AASHTO T164)	6 - 6.5%
Fiber Content by Total Mixture Mass	0.3% cellulose or 0.4% mineral
Rubber Solids (SBR) Content by Weight of the Bitumen	1.5-3% or TBD
Air Void Content (ASTM D6752/AASHTO T275)	16.0-22.0%
Draindown (ASTM D6390)*	≤ 0.3 %
Retained Tensile Strength (AASHTO 283)**	≥ 80 %
Cantabro abrasion test on unaged samples (ASTM D7064-04)	≤ 20%
Cantabro abrasion test on 7 day aged samples	≤ 30%

*Cellulose or mineral fibers may be used to reduce draindown.
**If the TSR (retained tensile strength) values fall below 80% when tested per NAPA IS 131 (with a single freeze thaw cycle rather than 5), then in Step 4, the contractor shall employ an anti-strip additive, such as hydrated lime (ASTM C977) or a fatty amine, to raise the TSR value above 80%.

SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.ccaa-vt.com

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DRAWN

SAL

CHECKED

DSM

APPROVED

DSM

OWNER:

BURLINGTON
HARBOR MARINA
LLC
1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

BURLINGTON
HARBOR MARINA

234 PENNY LANE
BURLINGTON VT 05401

DATE	CHECKED	REVISION

PERMEABLE
PAVEMENT
SPECIFICATIONS &
DETAILS

DATE

JAN. 13, 2017

SCALE

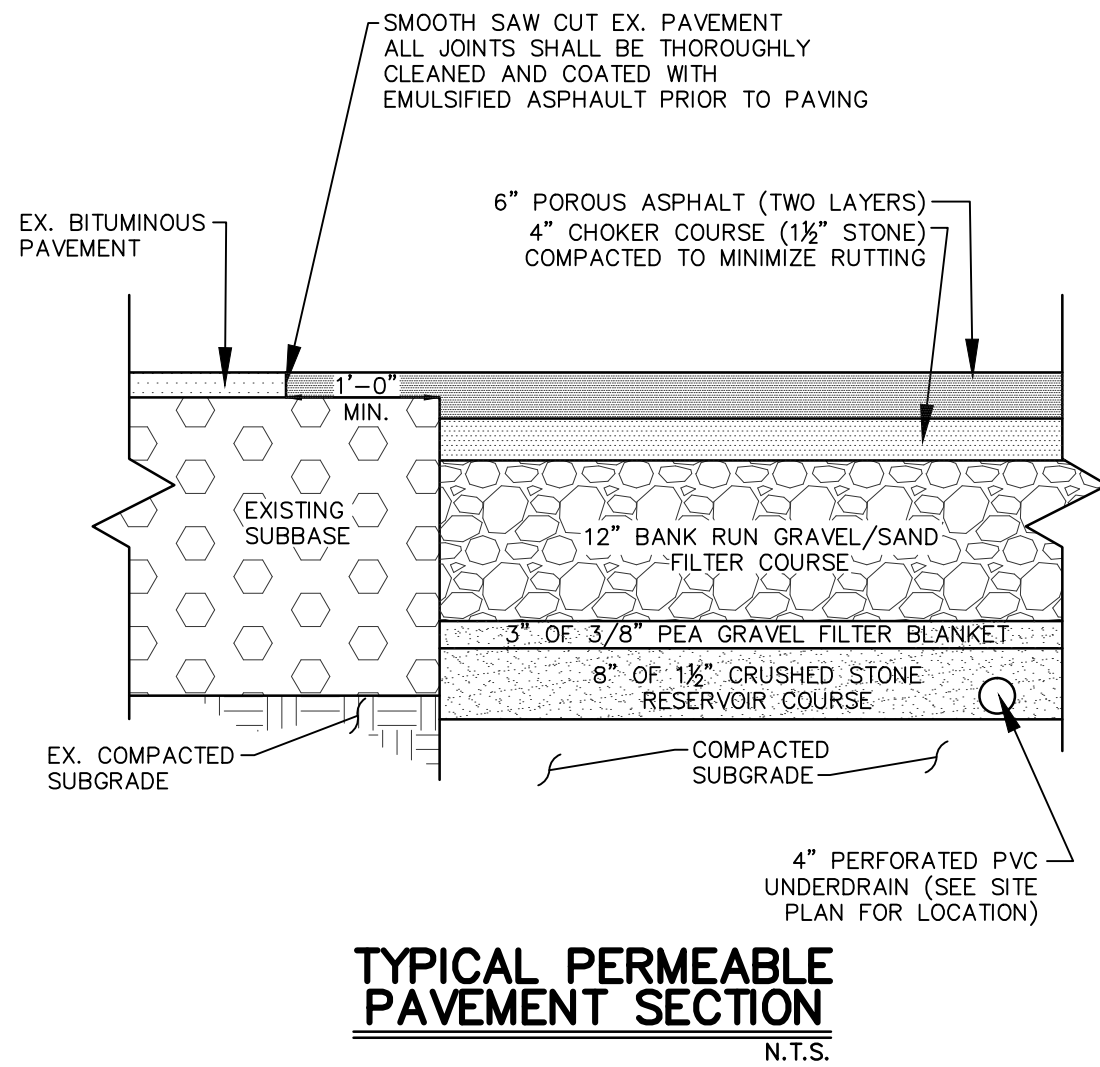
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PROJ. NO.

14115

DRAWING NUMBER

C6.0



TYPICAL PERMEABLE
PAVEMENT SECTION
N.T.S.

C. Porous Asphalt Mix Production

1. **Mixing Plants.**
Mixing plants shall meet the requirements of hot mix asphalt plants as specified in the state DOT or regional equivalent unless otherwise approved by the Engineer (e.g. Section 406-Plant Mix Pavements – General for Quality Assurance specifications in the Standard Specifications for Road and Bridge Construction – State of Vermont VTRANS, or latest revised edition and including supplemental specifications and updates).
2. **Preparation of Asphalt Binder.**
The asphalt material shall be heated to the temperature specified in the state AOT specification (if using a AOT spec for the mix) in a manner that will avoid local overheating. A continuous bsupply of asphalt material shall be furnished to the mixer at a uniform temperature.
3. **Preparation of Aggregates.**
The aggregate for the mixture shall be dried and heated at the mixing plant before being placed in the mixer. Flames used for drying and heating shall be properly adjusted to avoid damaging the aggregate and depositing soot or unburned fuel on the aggregate.
4. **Mineral filler**
Mineral filler if required to meet the grading requirements, shall be added in a manner approved by the Engineer after the aggregates have passed through the dryer.
5. **Mixing.**
The above preparation of aggregates does not apply for drum-mix plants. The dried aggregate shall be combined in the mixer in the amount of each fraction of aggregate required to meet the job-mix formula and thoroughly mixed prior to adding the asphalt material.

The dried aggregates shall be combined with the asphalt material in such a manner as to produce a mixture that when discharged from the pugmill is at a target temperature in the range that corresponds to an asphalt binder viscosity of 700 to 900 centistokes and within a tolerance of ± 11 °C (± 20 °F).

The asphalt material shall be measured or gauged and introduced into the mixer in the quantity determined by the Engineer for the particular material being used and at the temperature specified in the relevant specification.

After the required quantity of aggregate and asphalt material has been introduced into the mixer, the materials shall be mixed until a complete and uniform coating of the particles and a thorough distribution of the asphalt material throughout the aggregate is secured. The mixing time will be regulated by the Engineer.

All plants shall have a positive means of eliminating oversized and foreign material from being incorporated into the mixer.

6. **QC/QA During Production**
The Contractor shall provide at Contractors' expense and the Engineer's approval a third-party QA Inspector to oversee and document mix production. All mix testing results during production should be submitted to the QA Inspector.

The QC plan may be altered at the discretion of the Engineer and based on feasible testing as suggested by the asphalt producer. Certain QC testing requirements during production may not be feasible for small projects in which limited asphalt is generated. Some testing methods cannot be completed during the time needed during small batch production. The feasibility should be assessed with the Engineer and producer.

The mixing plant shall employ a Quality Control Technician (QCT). The QCT will perform QC/QA testing and will be certified in the discipline of HMA Plant Technician by the relevant certifying agency (e.g. NETTCP in New England). The Contractor shall sample, test and evaluate the mix in accordance with the methods and minimum frequencies in Table 6 and the Post-Blended SBR Binder Quality Control Plan (if applicable).

Table 6. QC/QA testing requirements during production.		
Test	Min. Frequency	Test Method
Temperature in Truck at Plant	6 times per day	
Gradation	greater of either (a) 1 per 500 tons, (b) 2 per day, or (c) 3 per job	AASHTO T30
Binder Content	greater of either (a) 1 per 500 tons, (b) 2 per day, or (c) 3 per job	AASHTO T164
Air Void Content	greater of either (a) 1 per 500 tons, (b) 2 per day, or (c) 3 per job	ASTM D6752
Binder Draindown	greater of either (a) 1 per 500 tons, (b) 1 per day, or (c) 1 per job	ASTM D6390

If an analyzed sample is outside the testing tolerances immediate corrective action will be taken. After the corrective action has been taken the resulting mix will be sampled and tested. If the re-sampled mix test values are outside the tolerances the Engineer will be immediately informed. The Engineer may determine that it is in the best interest of project that production is ceased. The Contractor will be responsible for all mix produced for the project.

Testing Tolerances During Production. Testing of the air void content, binder draindown, and TSR shall be within the limits set in Table 6. The paving mixture produced should not vary from the design criteria for aggregate gradation and binder content by more than the tolerances in Table 7.

Table 7. QC/QA testing tolerances during production.		
Sieve Size (inch/mm)	Percent Passing	
0.75/19	-	
0.50/12.5	±6.0	
0.375/9.5	±6.0	
No.4/4.75	±5.0	
No.8/2.36	±4.0	
No.200/0.075 (#200)	±2.0	
%PGAB	+0.4,-0.2	

Should the paving mixture produced vary from the designated grading and asphalt content by more than the above tolerances, the appropriate production modifications are to be made until the porous asphalt mix is within these tolerances.

Samples of the mixture, when tested in accordance with AASHTO T164 and T30, shall not vary from the grading proportions of the aggregate and binder content designated by the Engineer by more than the respective tolerances specified above and shall be within the limits specified for the design gradation.

7. **Plant Shutdown and Rejection of Mix.**
Should the porous asphalt mix not meet the tolerances specified in this section upon repeat testing, the Engineer may reject further loads of mix. Mix that is loaded into trucks during the time that the plant is changing operations to comply with a failed test shall not be accepted, and should be

recycled at the plant.

8. **Striping Paint**
Striping paint shall be latex, water-base emulsion, ready-mixed, and complying with pavement marking specifications PS TT-P-1952.

PART 3 EXECUTION

3.1 INSTALLATION

A. Porous Media Beds

Protection of native materials from over compaction is important. Proper compaction of select subbase materials is essential. Improper compaction of subbase materials will result in either 1) low pavement durability from insufficient compaction, or 2) poor infiltration due to over-compaction of subbase. Care must be taken to assure proper compaction as detailed below.

1. **Grade Control**
- a. Establish and maintain required lines and elevations. The Engineer shall be notified for review and approval of final stake lines for the work before construction work is to begin. Finished surfaces shall be true to grade and even, free of roller marks and free of puddle forming low spots. All areas must drain freely. Excavation elevations should be within +/- 0.1 ft (+/- 3 cm).
- b. If, in the opinion of the Engineer, based upon reports of the testing service and inspection, the quality of the work is below the standards which have been specified, additional work and testing will be required until satisfactory results are obtained.
- c. The Engineer shall be notified at least 24 hours prior to all porous media bed and porous pavement work.
2. **Subgrade Preparation**
- a. Native subgrade refers to materials beyond the limit of the excavation. The existing native subgrade material under all bed areas shall NOT be compacted or subject to excessive construction equipment traffic prior to geotextile and stone bed placement. Compaction is acceptable if an impermeable liner is used at the base of the porous asphalt system and infiltration is not desired.
- b. Where erosion of the native material subgrade has caused accumulation of fine materials and/or surface ponding, this material shall be removed with light equipment and the underlying soils scarified to a minimum depth of 6 inches with a York rake or equivalent and light tractor.
- c. Bring subgrade to line, grade, and elevations indicated. Fill and lightly regrade any areas damaged by erosion, ponding, or traffic compaction before the placing of the stone subbase.
- d. All bed bottoms are as level as feasible to promote uniform infiltration. For pavements subbases constructed on grade, soil or fabric barriers should be constructed along equal elevation for every 6-12' of grade change to act as internal check dams. This will prevent erosion within the subbase on slope.

3. Porous Media Bed Installation

- a. Subbase refers to materials below pavement surface and above native subgrade. Upon completion of subgrade work, the Engineer shall be notified and shall inspect at his/her discretion before proceeding with the porous media bed installation.
- b. Sideslope geotextile and porous media bed aggregate shall be placed immediately after approval of subgrade preparation. Any accumulation of debris or sediment which has taken place after approval of subgrade shall be removed prior to installation of geotextile at no extra cost to the Owner.
- c. Place sideslope geotextile in accordance with manufacturer's standards and recommendations. Adjacent strips of geotextile shall overlap a minimum of sixteen inches (16"). Secure geotextile at least four feet (1.2 m) outside of the bed excavation and take any steps necessary to prevent any runoff or sediment from entering the storage bed.
- d. Install filter course aggregate in 8-inch maximum lifts to a MAXIMUM of 95% standard proctor compaction (ASTM D698 / AASHTO T99). Install aggregate to grades indicated on the drawings.
- e. Install choker, gravel, and stone base course aggregate to a MAXIMUM of 95% compaction standard proctor (ASTM D698 / AASHTO T99). Choker should be placed evenly over surface of filter course bed, sufficient to allow placement of pavement, and notify Engineer for approval. Choker base course thickness shall be sufficient to allow for even placement of the porous asphalt but no less than 4-inches (10 cm) in depth.
- f. The density of subbase courses shall be determined by AASHTO T 191 (Sand-Cone Method), AASHTO T 204 (Drive Cylinder Method), or AASHTO T 238 (Nuclear Methods), or other approved methods at the discretion of the supervising engineer.
- g. The infiltration rate of the compacted subbase shall be determined by ASTM D3385 or approved alternate at the discretion of the supervising engineer. The infiltration rate shall be no less 5-30 ft/day or 50% of the hydraulic conductivity (D2434) at 95% standard proctor compaction (refer to section 2.1.A.5).
- h. Compaction of subbase course material shall be done with a method and adequate water to meet the requirements. Rolling and shaping shall continue until the required density is attained. Water shall be uniformly applied over the subbase course materials during compaction in the amount necessary for proper consolidation.
- i. Rolling and shaping patterns shall begin on the lower side and progress to the higher side of the subbase course while lapping the roller passes parallel to the centerline. Rolling and shaping shall continue until each layer conforms to the required grade and cross-section and the surface is smooth and uniform.
- j. Following placement of subbase aggregate, the sideslope geotextile shall be folded back along all bed edges to protect from sediment washout along bed edges. At least a four-foot edge strip shall be used to protect beds from adjacent bare soil. This edge strip shall remain in place until all bare soils contiguous to beds are stabilized and vegetated. In addition, take any other necessary steps to prevent sediment from washing into beds during site development. When the site is fully stabilized, temporary sediment control devices shall be removed.

4. **QC/QA requirements for Porous Media Bed Construction.**
QC/QA activities are summarized in Table 8.

B. Porous Asphalt Pavement Installation

1. **Mixing Plant**
The mixing plant, hauling and placing equipment, and construction methods shall be in conformance with NAPA IS 131 and applicable sections of the state AOT's specification for asphalt mixes. The use of surge bins shall not be permitted.

Table 8. QC/QA requirements for porous media bed construction.		
Activity	Schedule	
Contractor to notify Engineer for approval	24 hours in advance of start of work	
Contractor to employ soil inspector acceptable to Engineer	NA	
Contractor to employ staking and layout control inspector acceptable to Engineer	NA	
Contractor to employ site grading inspector acceptable to Engineer	NA	
Contractor to employ pavement work inspector acceptable to Engineer	NA	
Contractor to notify Engineer for approval	after subgrade preparation, before construction of porous media bed	
Contractor to notify Engineer for approval	after choker course placed, before placement of pavement	

2. **Hauling Equipment.**
The open graded mix shall be transported in clean vehicles with tight, smooth dump beds that have been sprayed with a non-petroleum release agent or soap solution to prevent the mixture from adhering to the dump bodies. Mineral filler, fine aggregate, slag dust, etc.shall not be used to dust truck beds. The open graded mix shall be covered during transportation with a suitable material of such size sufficient to protect the mix from the weather and also minimize mix cooling and the prevention of lumps. When necessary, to ensure the delivery of material at the specified temperature, truck bodies shall be insulated, and covers shall be securely fastened. Long hauls, particularly those in excess of 25 miles (40 km), may result in separation of the mix and its rejection.

3. **Placing Equipment.**
The paver shall be a self-propelled unit with an activated screed or strike-off assembly, capable of being heated if necessary, and capable of spreading and finishing the mixture without segregation for the widths and thicknesses required. In general, track pavers have proved superior for Porous Asphalt placement. The screed shall be adjustable to provide the desired cross-sectional shape. The finished surface shall be of uniform texture and evenness and shall not show any indication of tearing, shoving, or pulling of the mixture. The machine shall, at all times, be in good mechanical condition and shall be operated by competent personnel.

Pavers shall be equipped with the necessary attachments, designed to operate electronically, for controlling the grade of the finished surface.

The adjustments and attachments of the paver will be checked and approved by the Engineer before placement of asphalt material.

Pavers shall be equipped with a sloped plate to produce a tapered edge at longitudinal joints. The sloped plate shall be attached to the paver screed extension.

The sloped plate shall produce a tapered edge having a face slope of 1:3 (vertical: horizontal). The plate shall be so constructed as to accommodate compacted mat thickness from 35 to 100 mm (1 1/4 to 4 inches). The bottom of the sloped plate shall be mounted 10 to 15 mm (3/8 to 1/2 inch) above the existing pavement. The plate shall be interchangeable on either side of the screed.

Pavers shall also be equipped with a joint heater capable of heating the longitudinal edge of the previously placed mat to a surface temperature of 95 °C (200 °F), or higher if necessary, to achieve bonding of the newly placed mat with the previously placed mat. This shall be done without undue breaking or fracturing of aggregate at the interface. The surface temperature shall be measured immediately behind the joint heater. The joint heater shall be equipped with automated controls that shut off the burners when the pavement machine stops and reignite them with the forward movement of the paver. The joint heater shall heat the entire area of the previously placed wedge to the required temperature. Heating shall immediately precede placement of the asphalt material.

4. **Rollers.**
Rollers shall be in good mechanical condition, operated by competent personnel, capable of reversing without backlash, and operated at speeds slow enough to avoid displacement of the asphalt mixture. The mass (weight) of the rollers shall be sufficient to compact the mixture to the required density without crushing of the aggregate. Rollers shall beequipped with tanks and sprinkling bars for wetting the rolls. Rollers shall be two-axle tandem rollers with a gross mass (weight) of not less than 7 metric tons (8 tons) and not more than 10 metric tons (12 tons) and shall be capable of providing a minimum compactive effort of 44 kN/m (250 pounds per inch) of width of the drive roll. All rolls shall be at least 1 m (42 inches) in diameter. A rubber tired roller will not be required on the open graded asphalt friction course surface.
5. **Conditioning of Existing Surface.**
Contact surfaces such as curbing, gutters, and manholes shall be painted with a thin, uniform coat of Type RS-1 emulsified asphalt immediately before the asphalt mixture is placed against them.
6. **Temperature Requirements.**
The temperature of the asphalt mixture, at the time of discharge from the haul vehicle and at the paver, shall be between 135-163°C (275 to 325°F), within 6 °C (10 °F) of the compaction temperature for the approved mix design.

7. **Spreading and Finishing.**
The Porous Asphalt shall be placed either in a single application at 4 inches (10 cm) thick or in two lifts. If more than one lift is used, great care must be taken to insure that the porous asphalt layer join completely. This means: keeping the time between layer placements minimal; keeping the first layer clear from dust and moisture, and minimizing traffic on the first layer.

The Contractor shall protect all exposed surfaces that are not to be treated from damage during all phases of the pavement operation.

The asphalt mixture shall be spread and finished with the specified

equipment. The mixture shall be struck off in a uniform layer to the full width required and of such depth that each course, when compacted, has the required thickness and conforms to the grade and elevation specified. Pavers shall be used to distribute the mixture over the entire width or over such partial width as practical. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture shall be spread and raked by hand tools.

No material shall be produced so late in the day as to prohibit the completion of spreading and compaction of the mixture during daylight hours, unless night paving has been approved for the project.

No traffic will be permitted on material placed until the material has been thoroughly compacted and has been permitted to cool to below 38 °C (100 °F). The use of water to cool the pavement is not permitted. The Engineer reserves the right to require that all work adjacent to the pavement, such as guardrail, cleanup, and turf establishment, is completed prior to placing the wearing course when this work could cause damage to the pavement. On projects where traffic is to be maintained, the Contractor shall schedule daily pavement operations so that at the end of each working day all travel lanes of the roadway on which work is being performed are paved to the same limits. Suitable aprons to transition approaches, where required, shall be placed at side road intersections and driveways as directed by the Engineer.

8. **Compaction.**
Immediately after the asphalt mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. The compaction objective is 16% - 19% in place void content (Corelock).

Breakdown rolling shall occur when the mix temperature is between 135-163°C (275 to 325°F).

Intermediate rolling shall occur when the mix temperature is between 93-135°C (200 to 275°F).

Finish rolling shall occur when the mix temperature is between 66-93°C (150 to 200°F).

The cessation temperature occurs at approximately 79°C (175°F), at which point the mix becomes resistant to compaction. If compaction has not been done at temperatures greater than the cessation temperature, the pavement will not achieve adequate durability.

The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving.

Rollers or oscillating vibratory rollers, ranging from 8-12 tons, shall be used for compaction. The number, mass (weight), and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. Generally, one breakdown roller will be needed for each paver used in the spreading operation.

To prevent adhesion of the mixture to the rolls, rolls shall be kept moist with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot or lightly oiled hand tampons, smoothing irons or with mechanical tampons. On depressed areas, either a trench roller or created compression strips may be used under the roller to transmit compression to the depressed area.

Other combinations of rollers and/or methods of compacting may be used if approved in writing by the Engineer, provided the compaction requirements are met.

Unless otherwise specified, the longitudinal joints shall be rolled first. Next, the Contractor shall begin rolling at the low side of the pavement and shall proceed towards the center or high side with lapped rollings parallel to the centerline. The speed of the roller shall be slow and uniform to avoid displacement of the mixture, and the roller should be kept in as continuous operation as practical. Rolling shall continue until all roller marks and ridges have been eliminated.

Rollers will not be stopped or parked on the freshly placed mat.

It shall be the responsibility of the Contractor to conduct whatever process control the Contractor deems necessary. Acceptance testing will be conducted by the Engineer using cores provided by the Contractor.

Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture. The mixture shall be compacted to conform to the surrounding area. Any area showing an excess or deficiency of binder shall be removed and replaced. These replacements shall be at the Contractor's expense.

If the Engineer determines that unsatisfactory compaction or surface distortion is being obtained or damage to highway components and/or adjacent property is occurring using vibratory compaction equipment, the Contractor shall immediately cease using this equipment and proceed with the work in accordance with the fifth paragraph of this subsection.

The Contractor assumes full responsibility for the cost of repairing all damages that may occur to roadway or parking lot components and adjacent property if vibratory compaction equipment is used. After final rolling, no vehicular traffic of any kind shall be permitted on the surface until cooling and hardening has taken place, and in no case within the first 48 hours. For small batch jobs, curing can be considered to have occurred after the surface temperature is less than 100 °F (38 °C). Curing time is preferably one week, or until the entire surface temperature cools below 100 °F (38 °C). Provide barriers as necessary at no extra cost to the Owner to prevent vehicular use; remove at the discretion of the Engineer.

9. **Joints.**
Joints between old and new pavements or between successive day's work shall be made to ensure a thorough and continuous bond between the old and new mixtures. Whenever the spreading process is interrupted long enough for the mixture to attain its initial stability, the paver shall be removed from the mat and a joint constructed.

Butt joints shall be formed by cutting the pavement in a vertical plane at right angles to the centerline, at locations approved by the Engineer. The Engineer will determine locations by using a straightedge at least 4.9 m (16 feet) long. The butt joint shall be thoroughly coated with Type RS-1 emulsified asphalt just prior to depositing the pavement mixture when pavement resumes.

Tapered joints shall be formed by tapering the last 450 to 600 mm (18 to 24

inches) of the course being laid to match the lower surface. Care shall be taken in raking out and discarding the coarser aggregate at the low end of the taper, and in rolling the taper. The taper area shall be thoroughly coated with Type RS-1 emulsified asphalt just prior to resuming pavement. As the paver places new mixture on the taper area, an evenly graduated deposit of mixture shall complement the previously made taper. Shovels may be used to add additional mixture if necessary. The joint shall be smoothed with a rake, coarse material discarded, and properly rolled.

Longitudinal joints that have become cold shall be coated with Type RS-1 emulsified asphalt before the adjacent mat is placed. If directed by the Engineer, joints shall be cut back to a clean vertical edge prior to applying the emulsion.

10. **Surface Tolerances.**
The surface will be tested by the Engineer using a straightedge at least 4.9 m (16 feet) in length at selected locations parallel with the centerline. Any variations exceeding 3 mm (1/8 inch) between any two contact points shall be satisfactorily eliminated. A straightedge at least 3 m (10 feet) in length may be used on a vertical curve. The straightedges shall be provided by the Contractor.

Work shall be done expertly throughout, without staining or injury to other work. Transition to adjacent impervious asphalt pavement shall be merged neatly with flush, clean line. Finished pavement shall be even, without pockets, and graded to elevations shown on drawing.

Porous pavement beds shall not be used for equipment or materials storage during construction, and under no circumstances shall vehicles be allowed to deposit soil on paved porous surfaces.

11. **Repair of Damaged Pavement.**
Any existing pavement on or adjacent to the site that has been damaged as a result of construction work shall be repaired to the satisfaction of the Engineer without additional cost to the Owner.

12. **Striping Paint**
Vacuum and clean surface to eliminate loose material and dust.

Paint 4 inch wide parking striping and traffic lane striping in accordance with layouts of plan. Apply paint with mechanical equipment to produce uniform straight edges. Apply in two coats at manufacturer's recommended rates. Provide clear, sharp lines using white traffic paint

Color for Handicapped Markings: Blue

C. QC/QA for Paving Operations

1. The full permeability of the pavement surface shall be tested by application of clean water at the rate of at least 5 gpm (23 lpm) over the surface, using a hose or other distribution devise. Water used for the test shall be clean, free of suspended solids and deleterious liquids and will be provided at no extra cost to the Owner. All applied water shall infiltrate directly without large puddle formation or surface runoff, and shall be observed by the Engineer.
2. Testing and Inspection: Employ at Contractor's expense an inspection firm acceptable to the Engineer to perform soil inspection services, staking and layout control, and testing and inspection of site grading and pavement work. Inspection and list of tests shall be reviewed and approved in writing by the Engineer prior to starting construction. All test reports must be signed by a licensed Engineer.
3. Test in-place base and surface course for compliance with requirements for thickness and surface smoothness. Repair or remove or replace unacceptable work as directed by the Engineer.
4. Surface Smoothness: Test finished surface for smoothness using a 10 foot traightedge applied parallel with and at right angles to the centerline of the paved area. Surface will not be accepted if gaps or ridges exceed 3/16 of an inch.
5. QC/QA requirements during paving are summarized in Table 9.

Table 9. QC/QA requirements during paving.		
Activity	Schedule/ Frequency	Tolerance
Inspect truck beds for pooling (draindown)	every truck	NA
Take surface temp. behind joint heater	each pull	6°C (10°F) of compaction temp
Consult with Engineer to determine locations of butt joints	as needed	NA
Test surface smoothness & positive drainage with a 10 ft straightedge	after compaction	4.5 mm (3/16")
Consult with Engineer to mark core locations for QA testing	after compaction	NA
Hose test with at least 5 gpm water	after compaction	immediate infiltration, no puddling

PART 4. REFERENCES

CalTrans, January 2003, California Stormwater BMP Handbook 3 of 8 New Development and Redevelopment, California Dept. of Transportation, Sacramento, CA www.cabmphandbooks.com

USEPA, September, 1999, Storm Water Technology Fact Sheet: Infiltration Drainfields, Number: 832F99018 USEPA, Office of Water, Washington, DC http://www.epa.gov/npdes/pubs/infiltdrn.pdf

USEPA, September 2004, Stormwater Best Management Design Guide: Volume 1 General Considerations, Office of Research and Development, EPA/600/R-04/121, Washington, D.C.

Vermont Agency of Transportation, 2006, 2006 Standard Specifications for Construction Book, Division 700, Section 708, Montpelier, VT. http://www.aot.state.vt.us/conadmin/2006StandardSpecs.htm

Wisconsin Department of Natural Resources, Feb. 2004, Site Evaluation for Stormwater Infiltration(1002), Wisconsin Department of Natural Resources Conservation Practice Standards Madison, WI

SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cesa-vt.com

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DRAWN SAL	
CHECKED DSM	
APPROVED DSM	

OWNER:

**BURLINGTON
HARBOR MARINA
LLC**
**1 CHURCH STREET
BURLINGTON VT 05401**

PROJECT:

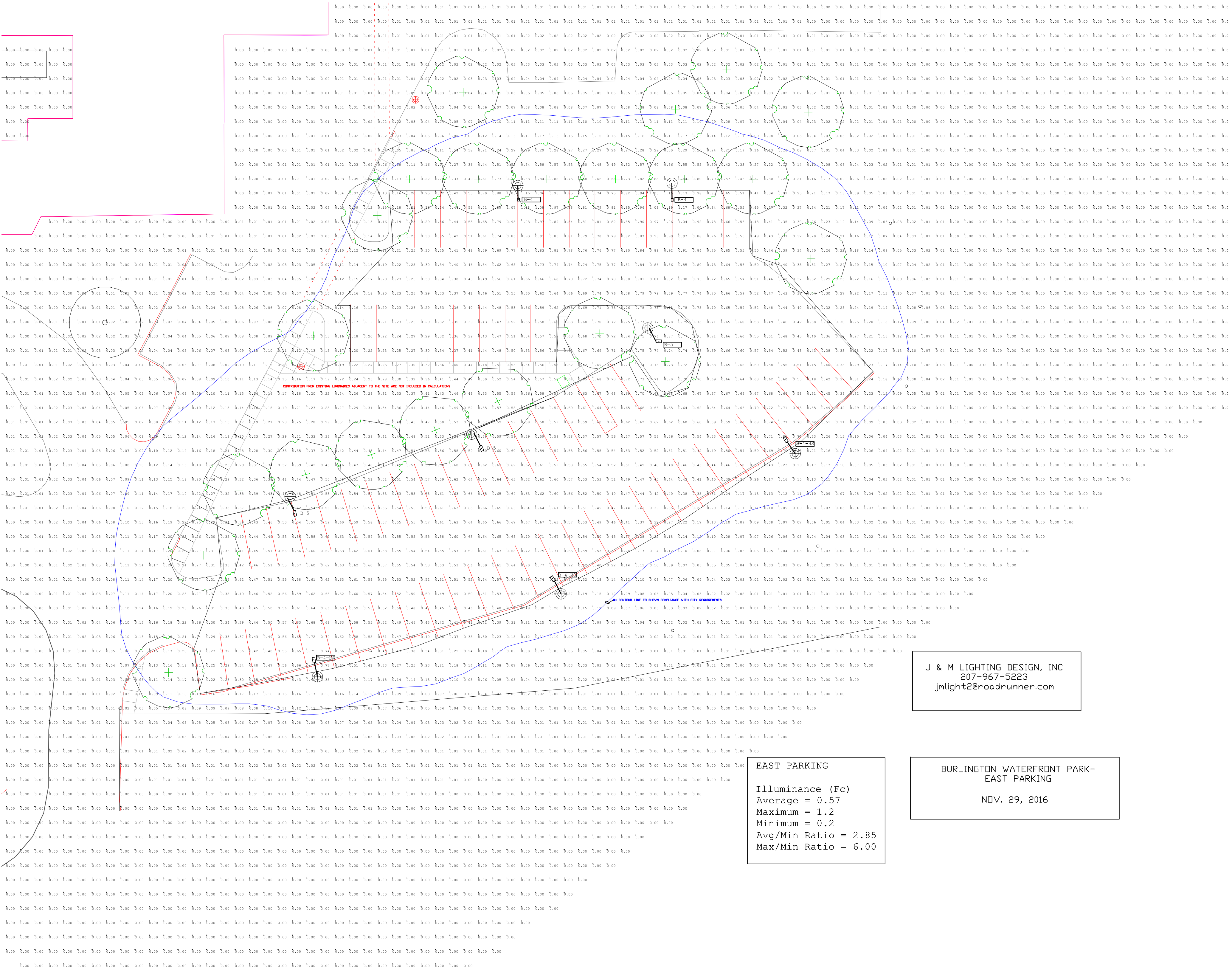
**BURLINGTON
HARBOR MARINA**

**234 PENNY LANE
BURLINGTON VT 05401**

DATE	CHECKED	REVISION

**PERMEABLE
PAVEMENT
SPECIFICATIONS &
DETAILS**

DATE JAN. 13, 2017	DRAWING NUMBER C6.1
SCALE AS SHOWN	
PROJ. NO. 14115	



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2	DRAWING				FIXTURE	BUG			WATTS AT		SURGE		FIXTURE +									
3	TYPE	MANUFACTURER	CATALOG NUMBER	FIXTURE ACCESSORIES	ACCESSORIES	RATING	DISTRIBUTION	FINISH	120 VOLT	VOLTS	PROTECTION	ARM	BRACKET	POLE	POLE HEIGHT	POLE ACCESSORIES	COLOR	CRI	PHOTOMETRIC FILE	PHOTOMETRIC	INITIAL	MEAN
4	B-4	PHILIPS	RVS-3532-LED-4K-R-LE-4-UNIV-CLO-RC-BKTX	RC = RECEPTACLE FOR TWIST-LOCK PHOTOCELL OR SHORTING CAP	CLO = CONSTANT LIGHT OUTPUT	B1-U0-G1	4	MATTE TEXTURED BLACK	36	120-277	YES	AC-6-1A-BKTX	0.6 + 3.06 + BANNER ARMS	ATR85V-25-1X36-11 1/2-DEC-BKTX	25'-0" ADJUST POLE HEIGHT TO ACHIEVE LUMINAIRE MOUNTING HEIGHT TO BOTTOM OF FIXTURE 25'-0" ABOVE THE GRADE	1/2-DEC-BKTX BRACKET ARM FOR BANNERS (2 per pole one side only)	4,000	70 +	RVS-35W32LED4K-R-LE4.IES	S1210243	3434	2747.2
5	B-4-HS	PHILIPS	RVS-3532-LED-4K-R-LE-4-UNIV-CLO-RC-BKTX	RC = RECEPTACLE FOR TWIST-LOCK PHOTOCELL OR SHORTING CAP	CLO = CONSTANT LIGHT OUTPUT	B0-U0-G1	4 WITH HOUSE SIDE SHIELD	MATTE TEXTURED BLACK	36	120-277	YES	AC-6-1A-BKTX	0.6 + 3.06 + BANNER ARMS	ATR85V-25-1X36-11 1/2-DEC-BKTX	25'-0" ADJUST POLE HEIGHT TO ACHIEVE LUMINAIRE MOUNTING HEIGHT TO BOTTOM OF FIXTURE 25'-0" ABOVE THE GRADE	1/2-DEC-BKTX BRACKET ARM FOR BANNERS (2 per pole one side only)	4,000	70 +	RVS-35W32LED4K-R-LE4-HS.IES	S1210262	2196	1756.8
6	B-5	PHILIPS	RVS-3532-LED-4K-R-LE-4-UNIV-CLO-RC-BKTX	RC = RECEPTACLE FOR TWIST-LOCK PHOTOCELL OR SHORTING CAP	CLO = CONSTANT LIGHT OUTPUT	B2-U0-G1	5	MATTE TEXTURED BLACK	36	120-277	YES	AC-6-1A-BKTX	0.6 + 3.06 + BANNER ARMS	ATR85V-25-1X36-11 1/2-DEC-BKTX	25'-0" ADJUST POLE HEIGHT TO ACHIEVE LUMINAIRE MOUNTING HEIGHT TO BOTTOM OF FIXTURE 25'-0" ABOVE THE GRADE	1/2-DEC-BKTX BRACKET ARM FOR BANNERS (2 per pole one side only)	4,000	70 +	RVS-35W32LED4K-R-LE5.IES	S1210301	3108	2486.4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1																							
2	DRAWING				FIXTURE	BUG	DISTRIBUTION				SURGE			FIXTURE +			POLE				PHOTOMETRIC	INITIAL	
3	TYPE	MANUFACTURER	CATALOG NUMBER	FIXTURE ACCESSORIES	ACCESSORIES	RATING	TYPE	FINISH	WATTS AT	VOLTS	PROTECTION	LUMENS	ARM	BRACKET	POLE	POLE HEIGHT	ACCESSORIES	COLOR	CRI	PHOTOMETRIC FILE	TEST NO.	LUMENS	MEAN
4	A4-HSS	AAL	UCM-STR-T4-32LED-4K-450-BLT-120-277	HSS = HOUSE SIDE SHIELD		B0-U0-G1	4 WITH HOUSE SIDE SHIELD	MATTE BLACK	48	120-277	YES	3,529	SLA-17	2.09	DB6-4R14-125-14-BLT-RBC-BBS4-24	13'-3"FROM BOTTOM OF LUMINAIRE TO GROUND	BANNER ARMS	4,000	73	UCM-ANG-T4-32LED-4K-450-HSS.IES	NA	3529	2823.2
5	A-5	AAL	UCM-STR-T5-32LED-4K-450-BLT-120-277			B3-U0-G1	5	MATTE BLACK	48	120-277	YES	4,825	SLA-17	2.09	DB6-4R14-125-14-BLT-RBC-BBS4-24	13'-3"FROM BOTTOM OF LUMINAIRE TO GROUND	BANNER ARMS	4,000	73	UCM-T5-32LED-4K-450.IES	NA	4825	3860
6	B-4-HSS	PHILIPS	RVS-3532-LED-4K-R-LE-4-UNIV-CLO-RC-BKTX	RC = RECEPTACLE FOR TWIST-LOCK PHOTOCELL OR SHORTING CAP	CLO = CONSTANT LIGHT OUTPUT	B0-U0-G1	4 WITH HOUSE SIDE SHIELD	MATTE TEXTURED BLACK	36	120-277	YES	3,434	AC-6-1A-BKTX	0.6 + 3.06	ATR85V-25-1X36-11 1/2-DEC-BKTX	25'-0" ADJUST POLE HEIGHT TO ACHIEVE LUMINAIRE MOUNTING HEIGHT TO BOTTOM OF FIXTURE 25'-0" ABOVE THE GRADE	NONE	4,000	70 +	RVS-35W32LED4K-R-LE4-HS.IES	S1210262-R1	2196	1756.8
7	C	AAL	UCS-STR--12 LED-NW-BLT-FCO-			B1-U2-G1		MATTE BLACK	32	120-277	YES	1,085	WCV	0.27	WALL MOUNT	NA	NONE	4,000	73	UCS-ANG-12LED-BW.IES	KL01878	1085	868
8																							
9	FLAG	FLAG WAREHOUSE	ORN-750032D			NA		GOLD-GREY	6	12	NO		BY FLAG POLE SUPPLIER		BY FLAG POLE SUPPLIER	35'-0"	BY FLAG POLE SUPPLIER	3,000		NA	NA	0	0

PROJECT: BURLINGTON HARBOR WATERFRONT -EAST PARKING
BURLINGTON, VT.

SECTION 5.5.2 OUTDOOR LIGHTING

SEC. 5.5.2-a Site Plan Review Required

SEC. 5.5.2-b Exemptions
Project claims no exemptions

SEC. 5.5.2-c Lighting Prohibited
Project is in compliance, no items on the project are falling within these criteria.

SEC. 5.5.2-d Lighting Plan Submission Requirements

SEC. 5.5.2-1- A site plan showing:

- A. See Attached site plan illustrates area being illuminated.
- B. Point by Point photometric analysis spacing is 2' x 2' grid.
 - Maximum: 1.2 foot-candles
 - Minimum: 0.2 foot-candles
 - Average: 0.58 foot-candles
- C. Calculation of the initial and mean lamps lumens per net acre across the entire site.

NET AREA = 0.7395 acres

TYPE B-4 = 3434 initial lumens X 2 = 6,868 total

TYPE B-4-HS= 2196 initial Lumens X 3 = 6,588 total

TYPE B-3 = 3108 initial Lumens X 3 = 9,324 total

GRAND TOTAL 22,780 INITIAL LUMENS

Mean lumens $22,780 \times .80 = 18,224$ mean lumens

30,804.6 LUMENS PER ACRE INITIAL

Drawing TYPE B-4, B-4-HS, B-5 are LED using a depreciation factor of .80.

- D. The number, type, location, and mounting height.
 - All luminaires are in compliance with City of Burlington criteria.
 - All luminaires are DLC

Drawing TYPE B-4

Philips RVS-3532LED4K-LE4-UNIV-CLO-RC-BKTX

MOUNTING HEIGHT: 25' FROM FLAT OPTICAL ASSEMBLY TO THE
GROUND

ARM LENGTH: 6'-0" (AC-6-1A-BKTX)

PHOTOMETRIC FILE: RVS-35W-32LED4K-R-LE4

TEST NO.: S1210243-R1

MOUNTING HEIGHT 25'-0" ABOVE GRADE

QUANTITY: 2

Drawing TYPE B-4-HS

Philips RVS-3532LED4K-LE4-HS-UNIV-CLO-RC-BKTX

MOUNTING HEIGHT: 25' FROM FLAT OPTICAL ASSEMBLY TO THE
GROUND

ARM LENGTH: 6'-0" (AC-6-1A-BKTX)

PHOTOMETRIC FILE: RVS-35W-32LED4K-R-LE4-HS

TEST NO.: S1210262-R1

MOUNTING HEIGHT 25'-0" ABOVE GRADE

QUANTITY: 3

Drawing TYPE B-5

Philips RVS-3532LED4K-LE5-UNIV-CLO-RC-BKTX

MOUNTING HEIGHT: 25' FROM FLAT OPTICAL ASSEMBLY TO THE
GROUND

ARM LENGTH: 6'-0" (AC-6-1A-BKTX)

PHOTOMETRIC FILE: RVS-35W-32LED4K-R-LE5

TEST NO.: S1210301-R1

MOUNTING HEIGHT 25'-0" ABOVE GRADE

QUANTITY: 3

SEC. 5.5.2-2

Vertical surfaces are not being illuminated by this proposed design.

SEC. 5.5.2-3

See attached documents Exhibit A

SEC. 5.5.2-4

To be determined by Administrative Officer

SEC. 5.5.2-e General Outdoor Lighting Standards

SEC. 5.5.2-1 Standard used was IES RP-33-2014 Lighting for Exterior Environments

SEC. 5.5.2-2 Standard used was IES RP-20-2014 Lighting for Parking Facilities

SEC. 5.5.2-3 Outdoor Lighting Manual for Vermont Municipalities edition 1996

SEC. 5.5.2-4 Fixtures used on this project comply with current BUG ratings rather than
deprecated "Full cut-off" "Cut-Off" criteria.

Drawing TYPE B-4 B1-U0-G1

Drawing TYPE B-4-HS B0-U0-G1

Drawing TYPE B-5 B2-U0-G1

Light levels on adjacent property are in compliance with the 0.1 foot-candle 20
feet beyond the development site.

SEC. 5.5.2-5 All LED luminaires are in compliance with a minimum CRI of 70 (75 CRI typical)
for the drawing TYPE B series of luminaires.

SEC. 5.5.2-6 Illumination levels are the highest levels measured horizontally at ground level.
The print-out assumes a flat site. Levels might fluctuate 20% over the life of the
LED, about 70,000 hours.

SEC. 5.5.2-7 The project is in compliance with no laser light sources.

SEC. 5.5.2-8 There are no flag poles on this project.

SEC. 5.5.2-9 There shall be no neon tubing or banding on this project.

SEC. 5.5.2-f Specific Outdoor Lighting Standards

SEC. 5.5.2-f-1 Parking Lot Lighting

- A. Street lighting pole height complies with the 25'-0" requirement for the parking areas
- B. Project complies with criteria of illumination levels do not exceed 4 initial foot-candles at any point.

"East Parking" Calculated 1.2 foot-candles maximum

- C. Illumination levels are for the functional area of the parking
 - D. Maximum to minimum uniformity ratios are under the 20:1 calculated at 6:00:1.
 - E. Illumination shall be reduced to 50% one hour after the end of public business hours
- Project, as proposed, is not in compliance.

No parking garages are part of this project

SEC. 5.5.2-f-2 Walkway Lighting

Not applicable

SEC. 5.5.2-f-3 Lighting of Gasoline Fueling Pump Islands and Canopies

Not applicable

SEC. 5.5.2-f-4 Other Vehicular Canopies:

Not applicable

SEC. 5.5.2-f-5 Parking Garage Lighting

Not applicable

SEC. 5.5.2-f-6 Lighting of Exterior Sales/Display Areas

Not applicable

SEC. 5.5.2-f-7 Security

Not applicable

SEC. 5.5.2-f-8 Outdoor Recreational Facility Lighting

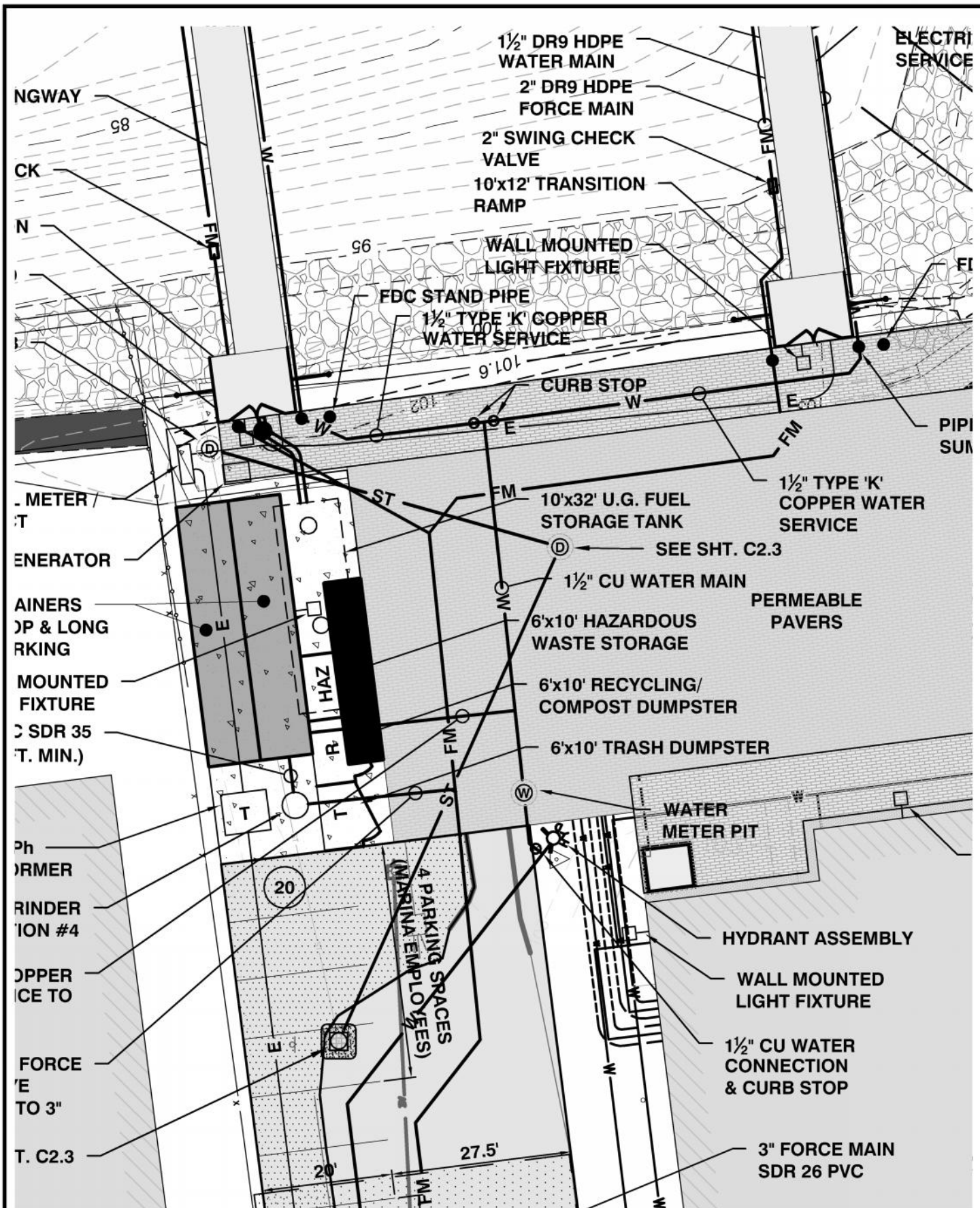
Not applicable

SEC. 5.5.2-f-9 Lighting of Building Facades

Not applicable

SEC. 5.5.2-g Exception

We are only using LED technologies on this project



CIVIL ENGINEERING ASSOCIATES, INC.

10 MANSFIELD VIEW LN., SO. BURLINGTON, VT 05403

802-864-2323 FAX: 802-864-2271

Scale: 1" = 20'

Drawn by SAL

Date 3/14/17

Checked by DSM



BURLINGTON HARBOR MARINA

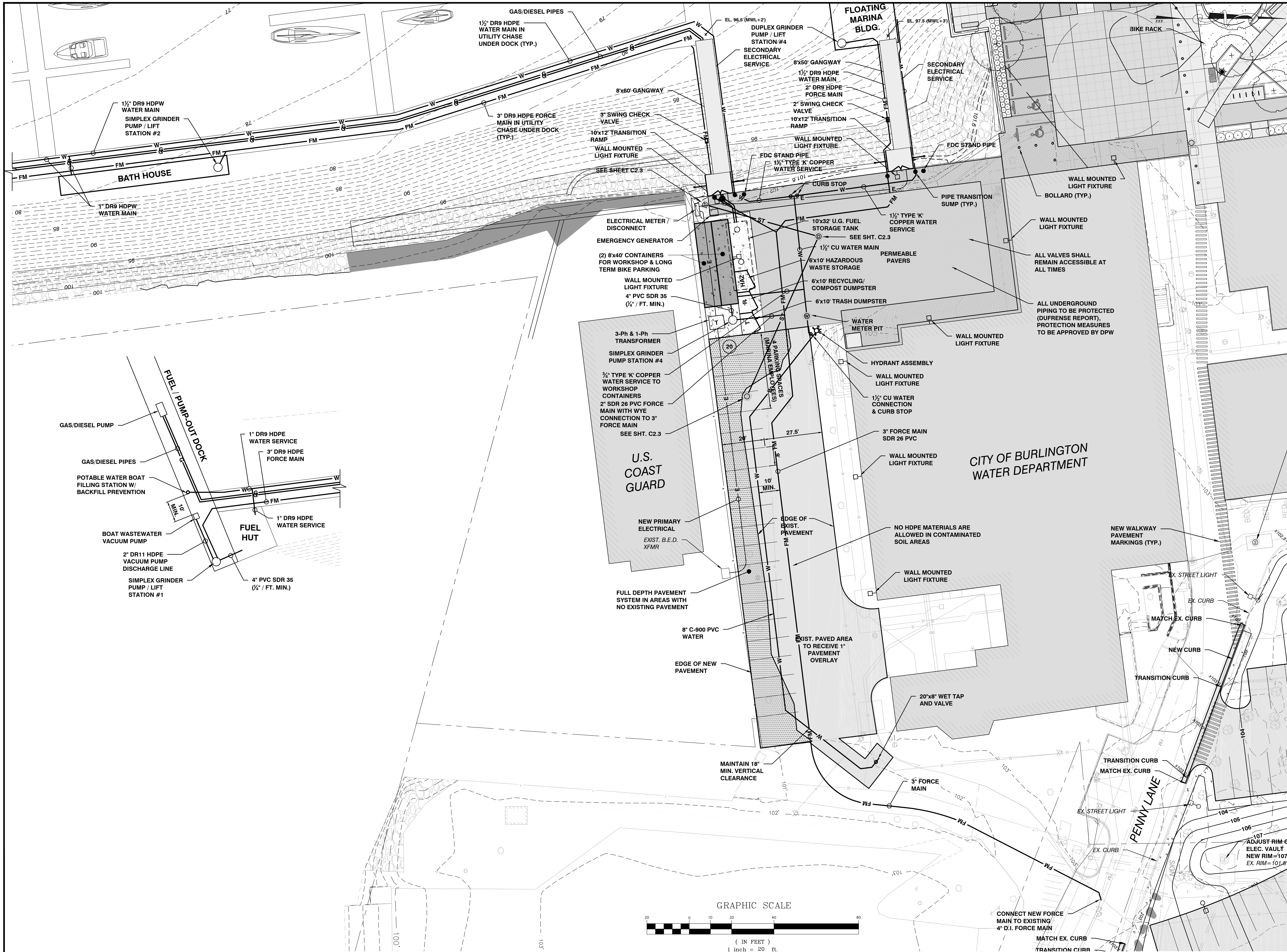
BURLINGTON

VERMONT

Project No.
14115

DRAWING

C2.2A



SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

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DRAWN

SAL

CHECKED

DSM

APPROVED

DSM

OWNER:

**BURLINGTON
HARBOR MARINA
LLC**

1 CHURCH STREET
BURLINGTON VT 05401

PROJECT:

**BURLINGTON
HARBOR MARINA**

234 PENNY LANE
BURLINGTON VT 05401



LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
1/24/17	DSM	MISC. CHANGES
3/14/17	DSM	RELOCATE WORK OUTSIDE FLOODPLAIN

**PROPOSED
CONDITIONS
PARTIAL SITE PLAN**

DATE
JAN. 13, 2017

SCALE
1" = 20'

PROJ. NO.
14115

DRAWING NUMBER

C2.2

Scott Gustin

From: Pfeiffer, Rebecca <Rebecca.Pfeiffer@vermont.gov>
Sent: Thursday, March 16, 2017 2:26 PM
To: dmarshall@cea-vt.com
Cc: 'Jack Wallace'; Scott Gustin
Subject: RE: Proposed Burlington Harbor Marina Project-Floodplain

Hello all,

In reviewing the updated site plans, it appears that the design will address the question about what development may be located within the SFHA, and therefore under the review of the City.

As I had stated in my earlier email, the buildings that are designed to float would appear to meet the FEMA definition of a functionally dependent use:

A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. This term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers and shipbuilding and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

FEMA regulations do allow for a variance from the non-residential building elevation requirements for functionally dependent uses. If a variance from the City's building elevation requirements is being considered for the floating marina buildings, FEMA's regulations state:

Under limited circumstances, variances may be issued for functionally dependent uses provided that the structure is protected by methods that minimize flood damages during the base flood and there are no additional threats to public safety.

The City's DRB would need to be able to make a finding that the protection methods proposed by the applicants would ensure that there are no additional threats to public safety. As I said in earlier emails, we would typically be looking at the protections measures taken to reduce the potential for fuel or sewage spills. As David had stated below, the flexible sewage line is designed to allow for the rise and fall of the dock. The DRB will need confirm that the line would be able to allow the bathroom building to float at least to the BFE (101.6' NAVD 1988) and be able to withstand anticipated wave action when the Lake is at the BFE, which should be somewhat minimized due to the breakwater. However, I would strongly recommend that the all of the flexible lines and any other systems be designed with the 2011 Lake flooding water and wave heights in mind.

As for the structures that are located below the BFE, the DRB should confirm that the dock and pier systems will be adequately anchored for water levels at the BFE, and should design the anchoring system to withstand wave forces as well.

Lastly, David had confirmed that the underground fuel storage tank will have a portion of the tank located below the BFE, and has been designed to incorporate tie-down straps. The DRB should confirm that the tank tie-down straps have been designed to withstand buoyancy force for the tank during a base flood.

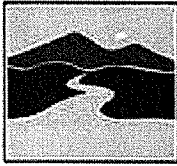
This was a general overview of the redesigned project, but I wanted to provide some comments to the DRB for consideration at their hearing. One of the primary things for the DRB to consider is whether to issue a variance from non-residential building elevation requirements, and if so, to have findings that demonstrate that the structures are protected by methods that minimize flood damages and that there are no additional threats to public safety. All of the development that is located within the SFHA would need to meet Burlington's standards for all development in 4.5.4(f)8.c(i)-(iii) & (v), and the standards for water supply and on-site disposal systems (4.5.4(f)8.F & G).

Please let me know if there are questions, or if there are any additional changes to the design that would require additional review.

As always, other State, Federal or local permits may be required for this project. The VT DEC Permit Specialist for your region should be able to help identify any other State Environmental Permits that may be necessary. These comments are offered in accordance with 24 VSA §4424.

Please let me know if you have any additional questions or would like to further discuss,

Rebecca



**WATERSHED
MANAGEMENT DIVISION**
RIVERS PROGRAM

Rebecca Pfeiffer, CFM | Floodplain Regulatory Team Lead/Northwest VT Floodplain Manager
River Corridor & Floodplain Protection Program
111 West Street
Essex Junction, VT 05452
C 802-490-6157 | F 802-879-3871

PLEASE NOTE MY NEW EMAIL ADDRESS: Rebecca.Pfeiffer@vermont.gov

Flood Ready Vermont: <http://floodready.vermont.gov/>
VT Floodplain Management Blog: <http://vtfpm.blogspot.com/>
VT ANR Natural Resources Atlas: <http://anrmaps.vermont.gov/websites/anra/>
River Corridor & Floodplain Protection Website: <http://dec.vermont.gov/watershed/rivers/river-corridor-and-floodplain-protection>

From: David Marshall [mailto:dmarshall@cea-vt.com]
Sent: Tuesday, March 14, 2017 12:24 PM
To: Pfeiffer, Rebecca <Rebecca.Pfeiffer@vermont.gov>
Cc: 'Jack Wallace' <jwallace@gmavt.net>; Scott Gustin <SGustin@burlingtonvt.gov>
Subject: RE: Proposed Burlington Harbor Marina Project-Floodplain

Hi Rebecca-

After discussing the City's zoning regulations with Scott Gustin, we have revised the plans to relocate all of the non-floating project components to locations outside of the Flood Plain limits (NAVD 88 101.6) except for the gangway anchors/landings which are considered to be a functionally dependent (recreational) use exempt from the regulation.

Please find attached the revised site plan (and an 8.5x11 enlargement as Sheet C2.2A) which includes a highlight of the 101.6 jurisdictional limits.

The specific changes made to the plan include:

1. The emergency generator and electrical disconnect south of the south gangway were consolidated at a location upgradient of the 101.6 contour.
2. The south gangway landing was moved to the south to tie into the existing grade at a point located above the 101.6 Flood plain elevation.
3. Modify the width of the connecting walkway from the north gangway landing to the south gangway landing so that all work is located above elevation 101.6.

All of the other subsurface work is located in the white (non-floodplain) non-jurisdictional portion of the attached Hazard Map zoning map.

Best Regards

David S. Marshall, P.E.
Civil Engineering Associates, Inc.
10 Mansfield View Lane
South Burlington, VT 05403
P 802-864-2323 x310 F 864-2271

From: David Marshall [mailto:dmarshall@cea-vt.com]
Sent: Monday, March 13, 2017 5:40 PM
To: 'Rebecca.Pfeiffer@vermont.gov'
Cc: 'Jack Wallace'
Subject: RE: Proposed Burlington Harbor Marina Project-Floodplain

Hi Rebecca-

Jack Wallace from Burlington Harbor Marina asked that I follow up with you with regard to the flood plain limits in the vicinity of the proposed marina project.

Attached is a site plan (Sheet C2,2) which has highlighted the 101.6 contour line. This mapping work is based on the NAVD 88 datum (see plan notes) as depicted on the attached existing conditions bathymetric survey map.

From your narrative below we have inserted our comments in (parenthesis)

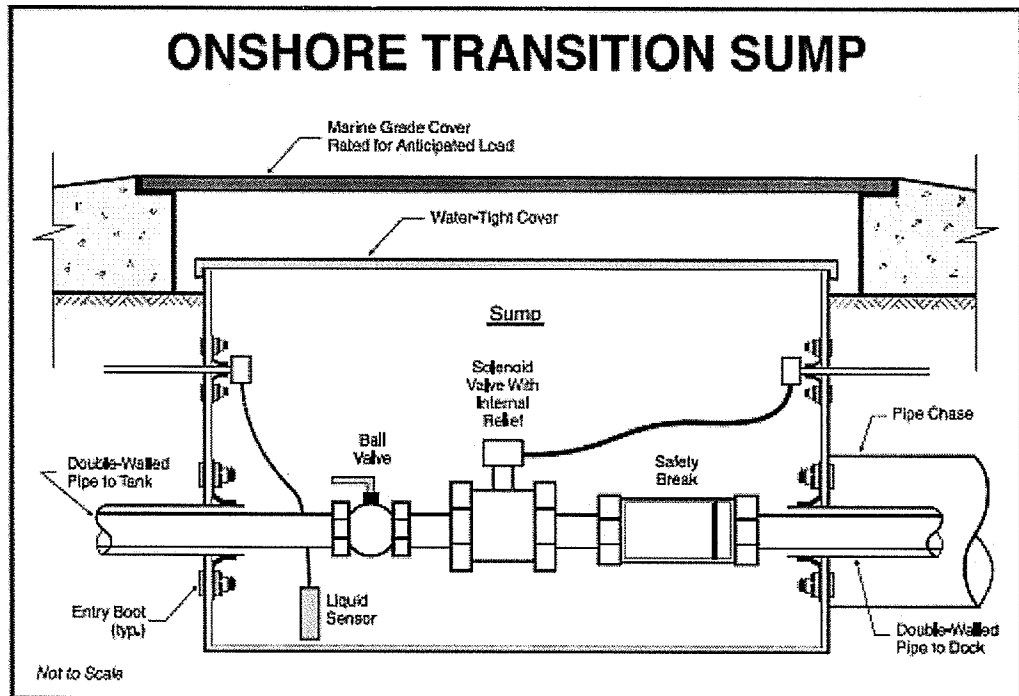
From the plans and the information you provided, it appears that both some parts of the upland improvements and the in-water docking infrastructure including the fuel hut (The structure is placed on the floating dock which will always be above the lake flood level), bath house (the same as the fuel hut), transformers (actually these are located above the 101.6 elevation), marina support building (This is located above the 101.6 elevation) and the gangways (The landing platforms for the gangways are located below the FEMA Special Flood Hazard Area (SFHA)) , etc. would be part of the local flood hazard area review.

Your narrative goes on to recommend:

I would recommend including the boundary of the FEMA Special Flood Hazard Area (SFHA) on your site plans, including the detailed upland improvement plans (This has been completed) . This would help to clarify if some of the upland infrastructure, like the emergency generator, underground fuel storage tanks (The top of the tanks are located above the FEMA flood limits. The below grade portion of the tanks are located below the 101.6 flood level but have been designed with tie-downs to prevent floatation), etc. are located within the SFHA and therefore be reviewed under Section 4.5.4(f) of the Burlington regulations.

We concur with your observation that the.

With regard to the fueling pipe work, the double wall pipes will terminate at a Transition Surge Tank which will monitor for spill or water infiltration which will automatically shut off the fuel



pumps.

is isolated at the shoreline with curb stops. The sewer force main is constructed of high pressure rated flexible piping with slack on the gangway that can withstand the elevation changes between the floating dock and the land side landing.

With regard to those features that are not considered to be functionally dependent uses, we look forward to your input on the best management practices that would be prudent to employ beyond those already identified.

Best Regards

David S. Marshall, P.E.
Civil Engineering Associates, Inc.
10 Mansfield View Lane
South Burlington, VT 05403
P 802-864-2323 x310 F 864-2271

From: Pfeiffer, Rebecca [<mailto:Rebecca.Pfeiffer@vermont.gov>]
Sent: Tuesday, February 28, 2017 11:48 AM
To: Monica Beers <MonicaB@kas-consulting.com>
Cc: Jeremy Roberts <JeremyR@kas-consulting.com>; Clare Santos <ClareS@kas-consulting.com>; Scott Gustin <SGustin@burlingtonvt.gov>; Stickney, Michaela <Michaela.Stickney@vermont.gov>
Subject: RE: Proposed Burlington Harbor Marina Project-Floodplain

Hi Monica,

Sorry for the delay in getting in touch about the floodplain impacts for the proposed Burlington Marina.

With a project on Lake Champlain, the main concern for floodplain impacts is any of the development that is located below 101.6' (NAVD 1988), and would be part of the City of Burlington's permit review under their Natural Resource Protection Overlay District (Section 4.5.4(f) of the Burlington Comprehensive Development Ordinance). For a project

this, there is no state permit for floodplain considerations, but we provide technical assistance to the municipality responsible for the local flood hazard area permitting.

From the plans and the information you provided, it appears that both some parts of the upland improvements and the in-water docking infrastructure including the fuel hut, bath house, transformers, marina support building and the gangways, etc. would be part of the local flood hazard area review. I would recommend including the boundary of the FEMA Special Flood Hazard Area (SFHA) on your site plans, including the detailed upland improvement plans. This would help to clarify if some of the upland infrastructure, like the emergency generator, underground fuel storage tanks, etc. are located within the SFHA and therefore be reviewed under Section 4.5.4(f) of the Burlington regulations.

For past marina projects, we have typically advised the municipality to consider the docks and other floating support buildings as “functionally dependent uses” which can be allowed in the flood hazard area. FEMA’s definition of a functionally dependent use:

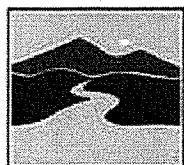
A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. This term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and shipbuilding and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Under limited circumstances, variances may be issued for functionally dependent uses provided that the structure is protected by methods that minimize flood damages during the base flood and there are no additional threats to public safety.

From past reviews of marina infrastructure, the main considerations would be the design of the buildings and infrastructure, which we would recommend to meet Burlington’s standards for all development in 4.5.4(f)8.c(i)-(iii) & and the standards for water supply and on-site disposal systems (4.5.4(f)8.F & G). We would also recommend that the bath house, fuel hut, transformers (presumably located on the transformer pads) and any other floating marina buildings demonstrate that the design would minimize potential threats to public safety. This would most likely include some steps of procedure to ensure that there is no fuel, oil or other hazardous materials in the fuel hut or around the docks during times of flooding, or that potential hazardous material connections be outfitted with shut-off valves or other safety measure. This would be to minimize the risk of a spill if there are waves that damage or overtop the building during flooding (not sure what type of waves the attenuators are designed for). This could be achieved by including a procedure in your comprehensive spill prevention plan.

This review would be a part of the City of Burlington’s permit review, and we provide recommendations and technical assistance to ensure that the minimum FEMA standards for flood hazard development have been met. I would be happy to meet with you and Scott Gustin of Burlington’s Planning & Zoning department if you have any questions or would like to discuss.

Rebecca



WATERSHED
MANAGEMENT DIVISION
RIVERS PROGRAM

Rebecca Pfeiffer, CFM | Floodplain Regulatory Team Lead/Northwest VT Floodplain Manager
River Corridor & Floodplain Protection Program
111 West Street
Essex Junction, VT 05452
C 802-490-6157 | F 802-879-3871

PLEASE NOTE MY NEW EMAIL ADDRESS: Rebecca.Pfeiffer@vermont.gov

Flood Ready Vermont: <http://floodready.vermont.gov/>

VT Floodplain Management Blog: <http://vtfpm.blogspot.com/>

VT ANR Natural Resources Atlas: <http://anrmaps.vermont.gov/websites/anra/>

River Corridor & Floodplain Protection Website: <http://dec.vermont.gov/watershed/rivers/river-corridor-and-floodplain-protection>

From: Monica Beers [<mailto:MonicaB@kas-consulting.com>]

Sent: Friday, January 27, 2017 9:53 AM

To: Pfeiffer, Rebecca <Rebecca.Pfeiffer@vermont.gov>

Cc: Jeremy Roberts <JeremyR@kas-consulting.com>; Clare Santos <ClareS@kas-consulting.com>

Subject: Proposed Burlington Harbor Marina Project-Floodplain

Dear Ms. Pfeiffer:

I am contacting you on behalf of the Burlington Harbor Marina, LLC. who are currently in the planning stages of building a marina at Burlington Harbor. We need to determine if the proposed project will impact the floodplain of Lake Champlain and if any other review is needed. Please let me know if this is something that you could help with. I have attached the site plans for the project for your review.

Please let me know if this something that you would be able to help with and if there is any other information that you need. Thank you for your help.

Best,



Monica Beers

Staff Scientist | monicab@kas-consulting.com

589 Avenue D, Suite 10 | PO Box 787 | Williston, VT 05495

www.kas-consulting.com | 802 383 0486 p | 802 383 0490 f

Please note that this communication and any response to it will be maintained as a public record and may be subject to disclosure under the Vermont Public Records Act.



Stormwater Management Plan Submission Requirements

Note, due to the varying requirements for each receiving system, it is best to review your project with the Stormwater Manager prior to submission of your project to the City of Burlington.

- General Information
 - o Project Address
 - o Owner
 - o Engineer
 - o Brief project description
 - o Receiving system identification
 - Combined Sewer (Main, North or East Plant)
 - Separate Storm (Lake, Winooski, Englesby, Centennial, Wetland, unnamed tributary)
- Existing conditions: description of existing conditions, description of existing stormwater system existing drainage issues, connectivity to City system
- Proposed Conditions: description of proposed conditions, brief description of proposed stormwater system, proposed method of discharge to receiving water or City system (overland flow, direct connection via pipe, existing or new manhole or CB)
- Stormwater Management Plan
 - o Impervious change summary

Condition	Type	Total Impervious (s.f.)	Effective Impervious ¹ (s.f)
Existing Conditions	Existing Impervious		
Proposed	Total Proposed (1+2+3)		
	1) New ²		
	2) Existing to Remain		
	3) Redeveloped		
Net New	Total Proposed – Existing		

- o Stormwater Management Summary (indicate method and what amounts of impervious are being addressed for each standard)

Standard	Amount of impervious managed	
	Net New impervious	Redeveloped/Existing impervious
Water Quality/Grit Removal		
Runoff Reduction		
Q1 peak control/reduction		
Q10 peak control/reduction		
Other		

¹ The area of impervious that generates runoff that would reach the collection system or an adjacent property boundary (without proposed stormwater management); may be via pipe connection or via sheet flow to roadway/curb/gutter or adjacent property.

² Impervious where there is not currently impervious

- Management Methods
 - Water Quality/Grit/Other
 - Runoff Reduction (infiltration, evapotranspiration processes)
 - Detention
 - Other
- Calculations/Model Results
 - Water Quality volume calculations
 - Other calculations as appropriate
 - PDFs of appropriate model results
- o Required Plans
 - Existing conditions
 - Proposed conditions
 - Stormwater Details
- o Stormwater Operation and Maintenance Plan
 - Simplified Plan showing the locations of all features of the stormwater system (manholes, tanks, rain gardens, catch basins, grit chambers, sand filters etc.) and assigning a unique identifier to each
 - Inspection Form/Table indicating
 - Frequency of inspection for each feature
 - What specifically needs to be inspected (plants, depth of grit, drain time)
 - Maintenance triggers (> 50% of sump depth, infiltration not draining in 24 (48) hours etc)
- o Confirmation that any covered parking/parking garage drainage is connected to an Oil/Grit separator and discharges to the sanitary sewer



February 24, 2017
File: 195311173

Attention: Mr. Dan Goltzman
Redstone
210 College Street, Ste 201
Burlington, VT 05401

Dear Dan,

Reference: 85 North Avenue, Burlington, VT

Per your request, we conducted an investigation of potential traffic impacts associated with the above referenced project. Based on this investigation, we conclude that the project will have no significant impacts on the area roadway system. Furthermore, the roadway system operates at a high level of service under existing conditions and has adequate capacity to also accommodate the project related traffic increases at the same high level of service.

PROJECT DESCRIPTION

The proposed development includes 43 apartment units (53 bedrooms) at 85 North Avenue in Burlington, Vermont. Parking for the project includes 43 spaces which will be provided in the lower level of the proposed building and within an existing surface lot. Vehicular access to the surface lot occurs by way of Lakeview Terrace and North Avenue. Access to the proposed parking garage is proposed by way of the surface lot.

EXISTING CONDITIONS

Site and Roadways

The project site is presently undeveloped with the exception of the existing surface parking lot. The existing parking lot has a 31-foot wide curb cut on North Avenue just south of its signalized intersection with North Street. This curb cut also connects Depot Street to Main Street. The lot can also be reached from the north via Lakeview Terrace. Roadways considered in this study include Lakeview Terrace, North Avenue, North Street and Depot Street.

Lakeview Terrace is a two-lane, two-way residential street entering the parking lot from the north. Parking is allowed on the east side of Lakeview Terrace. The roadway is approximately 27 feet wide with sidewalks on both sides. Lakeview Terrace has a north-south orientation parallel to North Avenue.

North Avenue is a two-lane, minor arterial serving as a principal access route to downtown Burlington from the north. It ends at Sherman Street approximately 1000 feet south of the project site. Parking is provided



February 24, 2017
Mr. Dan Goltzman
Page 2 of 7

Reference: 85 North Avenue, Burlington, VT

on the southbound side of North Avenue except in the immediate vicinity of North Street. Sidewalks are present on both sides of the roadway.

Depot Street is a 14-foot wide local roadway on a steep downgrade (north to south) from North Avenue to the Burlington waterfront. It is generally closed to vehicular traffic except to provide access to parking (fewer than ten spaces) for two residential buildings fronting on North Avenue and for special waterfront events. The roadway is also open to emergency vehicles.

North Street meets North Avenue from the east approximately 65 feet north of the parking lot driveway. North Street is a two-lane, two-way urban collector street serving a mix of commercial and residential land uses. Sidewalks are present on both sides of the roadway. On-street parking is permitted on the north side of the roadway well east of its intersection with North Avenue.

Intersections

The North Avenue/North Street intersection is under traffic signal control. There is a single approach lane on North Street at the intersection. North Avenue northbound also includes a single approach lane. The southbound North Avenue approach includes a through travel lane and a dedicated left-turn lane. Crosswalks are provided on all three intersection approaches. Push button signal actuation is available at all crossings to call an “all walk” signal phase which will stop all vehicular traffic movements. This intersection, along with all of North Avenue, has recently been evaluated as part of the *North Avenue Corridor Study* prepared by Parsons Brinckerhoff for the City of Burlington and dated September 2014.

Traffic Volumes

Traffic volume data are collected periodically by the Vermont Agency of Transportation (VTrans) and by the Chittenden County Regional Planning Commission (CCRPC) at major intersections in the region. Vehicle classification counts were most recently taken at the North Avenue/North Street intersection on June 13-14, 2016. The weekday AM and PM peak hour volumes are reported in Table 1. As shown, during the AM commuter peak hour the highest volume flow is southbound on North Avenue towards downtown Burlington with 503 through vehicles recorded. The pattern is reversed during the PM peak hour with 471 vehicles headed northbound on North Avenue. The volume entering North Avenue from North Street ranges from 58 vehicles during the AM per hour to 100 vehicles during the PM peak hour. Most of this traffic is oriented to the north. Pedestrian and bike traffic through the intersection is highest during PM peak hour with almost 21 movements observed during the PM peak and approximately 13 movements observed during the AM peak. The AM peak hour occurs 7:30 to 8:30 AM and the PM peak hour is from 3:45 to 4:45 PM. The 2016 traffic counts are comparable to counts taken on May 17, 2011 and used to establish baseline conditions for the North Avenue corridor study.



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Reference: 85 North Avenue, Burlington, VT

Direction/Movement	AM Peak Hour	PM Peak Hour
Northbound (North Ave.)		
Through	270	471
Right	28	55
Southbound (North Ave.)		
Left	43	47
Through	503	281
Westbound (North St.)		
Left	19	43
Right	39	57
TOTAL	902	954

Table 1 Existing Peak Hour Traffic Volumes – North Avenue/North Street Intersection

Operations

Existing intersection peak hour operating levels of service were calculated for the North Avenue/North Street intersection following procedures described in the latest edition of the *Highway Capacity Manual*. Operating level of service (LOS) is a term used to describe the quality of traffic flow on a roadway. It is an aggregate measure of travel delay, travel speed, congestion, driver discomfort, convenience, and safety based on a comparison of roadway capacity to travel demand. Operating levels of service are reported on a scale of A to F with LOS A representing the best operating conditions (little or no delay to motorists) and LOS F representing the worst operating conditions (long delays and with traffic demands sometimes exceeding roadway capacity.) The intersection presently operates at LOS A during both the AM peak hour and PM peak hour.

Field Observations

Field visits were made in February 2016 to observe existing peak hour traffic operations at the site and validate the reported conditions from the North Avenue corridor study. The North Avenue/North Street intersection was generally observed to operate freely during both peak hours consistent with the reported operations. During the AM peak hour, a crossing guard aided school children and other pedestrians crossing North Avenue. This resulted in frequent calls of the “all walk” signal phase. Buses turning right from North Avenue northbound to North Street were observed encroaching upon the westbound lane of



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Reference: 85 North Avenue, Burlington, VT

North Street however, the bus maneuvers were infrequent and the lane encroachment did not cause any apparent congestion. The crossing guard reported that the observed conditions were typical for this location noting however that congestion at the signalized Sherman Street/Park Street intersection can sometimes cause traffic to back up along North Avenue southbound during the AM peak hour.

During the peak period field visits, short duration (20-minute) traffic counts were conducted to record traffic patterns at the parking lot driveway/Depot Street intersection with North Avenue. During the morning observations, one vehicle turned left exiting onto North Avenue and five vehicles turned right onto North Avenue. All five of the vehicles turning right originated from Lakeview Terrace, north of the project site. Only two vehicles entered the site during this period. One exiting vehicle trip and one entering vehicle trip were oriented to Depot Street. Two pedestrians and two bikes were observed on Depot Street.

During the PM peak hour observations, no vehicles were observed using the parking lot driveway/Depot Street. Six pedestrians were observed using Depot Street. The office space that has use of the parking lot was not occupied on the day of the observations.

FUTURE CONDITIONS

Traffic volume conditions on the area roadway system were developed for two future scenarios. The “No Build” scenario considers area traffic growth independent of the proposed development. The “Build” scenario assumes that traffic generated by the proposed development is combined with the No Build traffic volumes. Future traffic conditions at the North Avenue/North Street study intersection were analyzed and compared for both No Build and Build conditions to quantify the impact of project traffic on operations. A 2035 design year was used for this analysis consistent with the North Avenue corridor study.

No Build Traffic Conditions

Future No Build traffic volumes were obtained from the North Avenue corridor study. The study considered historic traffic growth trends and expected population growth in determining a 0.6 percent per year growth rate for North Avenue south of VT 127. The net effect of this growth assumption is a 15 percent traffic increase by 2035 relative to existing conditions.

Site Traffic

Traffic forecasts for the proposed development project were based on the application of standard Institute of Transportation Engineers (ITE) trip rates. Based on the ITE trip rates for Land Use Code 220-Apartment, a 43-unit apartment building will generate 17 entering PM peak hour trips and nine exiting PM peak hour trips. However, the ITE trip rates are based on data generally collected at suburban sites where pedestrian, bike and transit trips are nominal. Downward adjustments to the ITE rates are appropriate where alternative travel modes may represent a significant portion of all site trips. In the U.S. census tract that includes the subject site, approximately fifty-three percent of all work trips are made via alternative modes. Consequently, the ITE trip rates were reduced by forty percent (to be conservative) for this project, indicating only 10 entering trips and six exiting trips during the PM peak hour. PM peak hour site traffic generation is approximately one vehicle trip entering or exiting every four minutes. Site traffic generation



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estimates for both peak hours are provided in Table 2. The project is expected to generate 172 vehicle trips on a daily basis as also shown in Table 2.

			Trips	
Time Period	Direction	Trip Rate (Trips / Dwelling Unit)	All Modes	Vehicles
AM Peak Hour	Entering	0.10	4	2
	Exiting	0.41	18	11
	Total	0.51	22	13
PM Peak Hour	Entering	0.40	17	10
	Exiting	0.22	9	6
	Total	0.62	26	16
Daily	Entering	3.33	143	86
	Exiting	3.33	143	86
	Total	6.65	286	172

Table 2 Project Traffic Generation

Anticipated site generated vehicle trips were assigned to the area roadway network. It was assumed that half of the trips would be oriented to north of the site passing through the North Avenue/North Street intersection. Of these trips 80 percent were assigned to North Avenue and 20 percent were assigned to North Street. The project trip assignments are documented in Table 3.



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Reference: 85 North Avenue, Burlington, VT

	AM Peak Hour			PM Peak Hour		
Direction/Movement	2035 No Build Volumes	Project Traffic	2035 Build Volumes	2035 No Build Volumes	Project Traffic	2035 Build Volumes
Northbound (North Ave.)						
Through	311	5	316	542	2	544
Right	32	1	33	63	1	64
Southbound (North Ave.)						
Left	50	0	50	54	0	54
Through	579	1	580	323	4	327
Westbound (North St.)						
Left	22	0	22	50	1	51
Right	45	0	45	66	0	66
TOTAL	1039	7	1046	1098	8	1106

Table 3 Future Peak Hour Traffic Volumes – North Avenue/North Street Intersection

The combined project traffic and No Build traffic volumes represent the Build condition traffic volumes which are also shown in Table 3. As noted, based on the assumptions described above, the project will add on average only eight peak hour vehicles to the subject intersection. This represents less than a one percent (0.7 percent) increase in volumes over the No Build conditions.

Future Traffic Operations

The traffic operations analyses completed above for existing traffic conditions were repeated for 2035 No Build and 2035 Build conditions for the North Avenue/North Street intersection. The results for all three conditions are presented in Table 4. As shown, the subject intersection will experience a decline in level of service by one letter grade in the PM peak hour due to the assumed 15 percent growth in traffic by the 2015 design year, although the AM peak hour will remain at the same level of service. The intersection will continue to operate well below capacity during both future Build and No Build conditions. The added project traffic will not have a measurable or noticeable impact on intersection operations. The calculated



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Reference: 85 North Avenue, Burlington, VT

level of service remains at LOS B or better under No Build and Build conditions. The overall vehicle delay is not expected to increase as a result of the additional project related traffic. Capacity analysis worksheets for all analysis conditions are attached.

	2016			2035					
	Existing			No-Build			Build		
Peak Hour	LOS ¹	Delay ²	V/C ³	LOS	Delay	V/C	LOS	Delay	V/C
AM	A	7	0.45	A	9	0.62	A	9	0.62
PM	A	9	0.50	B	15	0.63	B	15	0.63

¹ LOS= Level of Service

² Delay = Average delay expressed in seconds per vehicle

³ V/C = Volume-to-capacity ratio for critical movements

Table 4 North Avenue/North Street Intersection Operations

CONCLUSION

The proposed development will not have a significant impact on area traffic operations. It will add only 0.7 percent to the peak traffic volumes at the North Avenue/North Street intersection. The intersection presently operates well below its capacity during commuter peak hours and will continue to do so after the project is built.

Thank you for the opportunity in assisting you with this project. Please do not hesitate to call if you have questions regarding the above.

Regards,

Stantec Consulting

Richard S. Bryant
Senior Associate
Phone: 802 864 0223
Fax: 802 864 0165
Richard.Bryant@stantec.com

Attachments: Traffic Counts, Capacity Analysis Worksheets

rbv:\1953\active\195311183\transportation\5_traffic\docs\report\2017-02-24_TIS.docx

Peak Hour Data for Intersection

Int ID: 30403305
 Community: BURLINGTON
 Road 1: NORTH AV
 Road 2: NORTH ST

Corridor: NA
 Road 3: NORTH AV
 Road 4: PARKING LOT

<< < > >> 1-5 of 5

AM Peak Hour 06/14/2016

NB					EB					SB					WB					App	Int
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	66	12	1	78	0	0	0	0	0	6	136	0	0	142	4	0	14	2	18	238
7:45 AM	0	76	5	0	81	0	0	0	1	0	16	130	0	0	146	4	0	13	0	17	244
8:00 AM	0	55	6	2	61	0	0	0	1	0	17	120	0	0	137	5	0	7	1	12	210
8:15 AM	0	73	5	4	78	0	0	0	1	0	4	117	0	0	121	6	0	5	0	11	210
Total	0	270	28	7	298	0	0	0	3	0	43	503	0	0	546	19	0	39	3	58	902
PHF	0.89 0.58				0.92	0.63 0.92					0.93 0.79					0.70				0.81	
HV %	8 18					7 3					0 10										

Midday Peak Hour 06/14/2016

NB					EB					SB					WB					App	Int
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	65	9	0	74	0	0	0	0	0	8	51	0	0	59	12	0	11	0	23	156
11:15 AM	0	62	4	1	66	0	0	0	3	0	11	58	0	0	69	6	0	18	1	24	159
11:30 AM	0	78	8	0	86	0	0	0	0	0	13	78	0	0	91	6	0	13	0	19	196
11:45 AM	0	73	6	1	79	0	0	0	0	0	15	62	0	0	77	12	0	14	0	26	182
Total	0	278	27	2	305	0	0	0	3	0	47	249	0	0	296	36	0	56	1	92	693
PHF	0.89 0.75				0.89	0.78 0.80					0.81 0.75					0.78				0.88	
HV %	4 7					11 8					0 5										

PM Peak Hour 06/13/2016

NB					EB					SB					WB					App	Int
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
3:45 PM	0	113	13	1	126	0	0	0	3	0	14	81	0	0	95	14	0	16	1	30	251
4:00 PM	0	105	16	8	121	0	0	0	0	0	13	61	0	0	74	10	0	8	1	18	213
4:15 PM	0	121	8	1	129	0	0	0	0	0	12	67	0	0	79	12	0	14	1	26	234
4:30 PM	1	132	18	3	151	0	0	0	0	0	8	72	0	0	80	7	0	19	3	26	257
Total	1	471	55	13	527	0	0	0	3	0	47	281	0	0	328	43	0	57	6	100	955
PHF	0.25 0.89 0.76				0.87	0.84 0.87					0.86 0.77					0.75				0.83	
HV %	0 2 7					9 2					0 4										

Phasings

3: North Avenue & North Street

02/24/201

	↙	↑	↘	↓	
Lane Group	WBL	NBT	SBL	SBT	Ø9
Protected Phases	8	2		6	9
Permitted Phases			6		
Minimum Initial (s)	6.0	10.0	10.0	10.0	5.0
Minimum Split (s)	11.0	15.0	15.0	15.0	18.0
Total Split (s)	11.0	31.0	31.0	31.0	18.0
Total Split (%)	18.3%	51.7%	51.7%	51.7%	30%
Maximum Green (s)	6.0	26.0	26.0	26.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lead/Lag					
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	1.5	2.0	2.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	Min	Min	None
Walk Time (s)					7.0
Flash Dont Walk (s)					6.0
Pedestrian Calls (#/hr)					20
90th %ile Green (s)	6.0	26.0	26.0	26.0	13.0
90th %ile Term Code	Max	Hold	Max	Max	Ped
70th %ile Green (s)	6.0	27.8	27.8	27.8	0.0
70th %ile Term Code	Max	Dwell	Dwell	Dwell	Skip
50th %ile Green (s)	6.0	29.1	29.1	29.1	0.0
50th %ile Term Code	Max	Dwell	Dwell	Dwell	Skip
30th %ile Green (s)	0.0	25.0	25.0	25.0	0.0
30th %ile Term Code	Skip	Dwell	Dwell	Dwell	Skip
10th %ile Green (s)	0.0	25.0	25.0	25.0	0.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell	Skip

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 41.8
 Control Type: Semi Act-Uncoord
 90th %ile Actuated Cycle: 60
 70th %ile Actuated Cycle: 43.8
 50th %ile Actuated Cycle: 45.1
 30th %ile Actuated Cycle: 30
 10th %ile Actuated Cycle: 30

HCM Signalized Intersection Capacity Analysis 3: North Avenue & North Street

02/24/201

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰		↑		↱	↑
Traffic Volume (vph)	19	39	270	28	43	503
Future Volume (vph)	19	39	270	28	43	503
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		5.0	5.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1667		1839		1770	1863
Flt Permitted	0.98		1.00		0.57	1.00
Satd. Flow (perm)	1667		1839		1052	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	42	293	30	47	547
RTOR Reduction (vph)	39	0	5	0	0	0
Lane Group Flow (vph)	24	0	318	0	47	547
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	3.1		28.2		28.2	28.2
Effective Green, g (s)	3.1		28.2		28.2	28.2
Actuated g/C Ratio	0.06		0.59		0.59	0.59
Clearance Time (s)	5.0		5.0		5.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	107		1078		616	1092
v/s Ratio Prot	c0.01		0.17			c0.29
v/s Ratio Perm					0.04	
v/c Ratio	0.22		0.30		0.08	0.50
Uniform Delay, d1	21.4		5.0		4.3	5.8
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.1		0.2		0.1	0.4
Delay (s)	22.4		5.1		4.4	6.2
Level of Service	C		A		A	A
Approach Delay (s)	22.4		5.1			6.0
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			48.1		Sum of lost time (s)	15.0
Intersection Capacity Utilization			41.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Phasings
3: North Avenue & North Street

02/24/2017

	↙	↑	↘	↓	
Lane Group	WBL	NBT	SBL	SBT	Ø9
Protected Phases	8	2		6	9
Permitted Phases			6		
Minimum Initial (s)	6.0	10.0	10.0	10.0	5.0
Minimum Split (s)	11.0	15.0	15.0	15.0	18.0
Total Split (s)	11.0	31.0	31.0	31.0	18.0
Total Split (%)	18.3%	51.7%	51.7%	51.7%	30%
Maximum Green (s)	6.0	26.0	26.0	26.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lead/Lag					
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	1.5	2.0	2.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	Min	Min	None
Walk Time (s)					7.0
Flash Dont Walk (s)					6.0
Pedestrian Calls (#/hr)					20
90th %ile Green (s)	6.0	26.0	26.0	26.0	13.0
90th %ile Term Code	Max	Max	Hold	Hold	Ped
70th %ile Green (s)	6.0	18.8	18.8	18.8	0.0
70th %ile Term Code	Max	Dwell	Dwell	Dwell	Skip
50th %ile Green (s)	6.0	21.9	21.9	21.9	0.0
50th %ile Term Code	Max	Dwell	Dwell	Dwell	Skip
30th %ile Green (s)	6.0	27.8	27.8	27.8	0.0
30th %ile Term Code	Max	Dwell	Dwell	Dwell	Skip
10th %ile Green (s)	0.0	25.0	25.0	25.0	0.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell	Skip

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 41.3
 Control Type: Semi Act-Uncoord
 90th %ile Actuated Cycle: 60
 70th %ile Actuated Cycle: 34.8
 50th %ile Actuated Cycle: 37.9
 30th %ile Actuated Cycle: 43.8
 10th %ile Actuated Cycle: 30

HCM Signalized Intersection Capacity Analysis 3: North Avenue & North Street

02/24/201

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑		↘	↑
Traffic Volume (vph)	43	57	471	55	47	281
Future Volume (vph)	43	57	471	55	47	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		5.0	5.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frt	0.92		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1683		1836		1770	1863
Flt Permitted	0.98		1.00		0.36	1.00
Satd. Flow (perm)	1683		1836		668	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	62	512	60	51	305
RTOR Reduction (vph)	56	0	6	0	0	0
Lane Group Flow (vph)	53	0	566	0	51	305
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	4.7		24.9		24.9	24.9
Effective Green, g (s)	4.7		24.9		24.9	24.9
Actuated g/C Ratio	0.10		0.54		0.54	0.54
Clearance Time (s)	5.0		5.0		5.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	170		985		358	999
v/s Ratio Prot	c0.03		c0.31			0.16
v/s Ratio Perm					0.08	
v/c Ratio	0.31		0.58		0.14	0.31
Uniform Delay, d1	19.4		7.2		5.4	6.0
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.1		0.8		0.2	0.2
Delay (s)	20.4		8.0		5.6	6.1
Level of Service	C		A		A	A
Approach Delay (s)	20.4		8.0			6.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			8.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			46.4		Sum of lost time (s)	15.0
Intersection Capacity Utilization			53.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Phasings

3: North Avenue & North Street

02/24/2017

	↙ ↑ ↘ ↓				
Lane Group	WBL	NBT	SBL	SBT	Ø9
Protected Phases	8	2	1	6	9
Permitted Phases			6		
Minimum Initial (s)	6.0	10.0	6.0	10.0	5.0
Minimum Split (s)	11.0	15.0	11.0	15.0	18.0
Total Split (s)	11.0	25.0	11.0	36.0	18.0
Total Split (%)	16.9%	38.5%	16.9%	55.4%	28%
Maximum Green (s)	6.0	20.0	7.0	31.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	0.0	1.0	1.0
Lead/Lag		Lag	Lead		
Lead-Lag Optimize?		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	1.5	2.0	3.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	None
Walk Time (s)					7.0
Flash Dont Walk (s)					6.0
Pedestrian Calls (#/hr)					20
90th %ile Green (s)	6.0	20.0	7.0	31.0	13.0
90th %ile Term Code	Max	Max	Max	Max	Ped
70th %ile Green (s)	6.0	15.0	6.2	25.2	0.0
70th %ile Term Code	Max	Gap	Gap	Hold	Skip
50th %ile Green (s)	6.0	22.0	0.0	22.0	0.0
50th %ile Term Code	Max	Dwell	Skip	Dwell	Skip
30th %ile Green (s)	0.0	25.0	0.0	25.0	0.0
30th %ile Term Code	Skip	Dwell	Skip	Dwell	Skip
10th %ile Green (s)	0.0	25.0	0.0	25.0	0.0
10th %ile Term Code	Skip	Dwell	Skip	Dwell	Skip

Intersection Summary

Cycle Length: 65
 Actuated Cycle Length: 40.8
 Control Type: Semi Act-Uncoord
 90th %ile Actuated Cycle: 65
 70th %ile Actuated Cycle: 41.2
 50th %ile Actuated Cycle: 38
 30th %ile Actuated Cycle: 30
 10th %ile Actuated Cycle: 30

HCM Signalized Intersection Capacity Analysis 3: North Avenue & North Street

02/24/201

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T		T	T
Traffic Volume (vph)	22	45	311	32	50	579
Future Volume (vph)	22	45	311	32	50	579
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1667		1839		1770	1863
Flt Permitted	0.98		1.00		0.43	1.00
Satd. Flow (perm)	1667		1839		797	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	49	338	35	54	629
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	73	0	373	0	54	629
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	3.2		23.8		29.9	29.9
Effective Green, g (s)	3.2		23.8		29.9	29.9
Actuated g/C Ratio	0.06		0.48		0.60	0.60
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	107		880		520	1120
v/s Ratio Prot	c0.04		0.20		0.00	c0.34
v/s Ratio Perm					0.06	
v/c Ratio	0.68		0.42		0.10	0.56
Uniform Delay, d1	22.8		8.5		4.4	6.0
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	16.5		0.3		0.1	0.6
Delay (s)	39.2		8.8		4.5	6.6
Level of Service	D		A		A	A
Approach Delay (s)	39.2		8.8			6.4
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			9.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			49.7		Sum of lost time (s)	19.0
Intersection Capacity Utilization			43.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Phasings

3: North Avenue & North Street

02/24/201

	↙	↑	↘	↓	
Lane Group	WBL	NBT	SBL	SBT	Ø9
Protected Phases	8	2	1	6	9
Permitted Phases			6		
Minimum Initial (s)	6.0	10.0	6.0	10.0	5.0
Minimum Split (s)	11.0	15.0	10.0	15.0	18.0
Total Split (s)	14.0	48.0	10.0	58.0	18.0
Total Split (%)	15.6%	53.3%	11.1%	64.4%	20%
Maximum Green (s)	9.0	43.0	6.0	53.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	0.0	1.0	1.0
Lead/Lag		Lag	Lead		
Lead-Lag Optimize?		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	1.5	2.0	3.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	None
Walk Time (s)					7.0
Flash Dont Walk (s)					6.0
Pedestrian Calls (#/hr)					20
90th %ile Green (s)	9.0	43.0	6.0	53.0	13.0
90th %ile Term Code	Max	Max	Max	Hold	Ped
70th %ile Green (s)	9.0	41.0	6.0	51.0	13.0
70th %ile Term Code	Max	Gap	Max	Hold	Ped
50th %ile Green (s)	9.0	25.0	6.0	35.0	0.0
50th %ile Term Code	Max	Gap	Max	Hold	Skip
30th %ile Green (s)	9.0	26.9	0.0	26.9	0.0
30th %ile Term Code	Max	Dwell	Skip	Dwell	Skip
10th %ile Green (s)	7.3	27.1	0.0	27.1	0.0
10th %ile Term Code	Gap	Dwell	Skip	Dwell	Skip

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 64.5
 Control Type: Semi Act-Uncoord
 90th %ile Actuated Cycle: 90
 70th %ile Actuated Cycle: 88
 50th %ile Actuated Cycle: 54
 30th %ile Actuated Cycle: 45.9
 10th %ile Actuated Cycle: 44.4

HCM Signalized Intersection Capacity Analysis 3: North Avenue & North Street

02/24/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	YT		PT		YT	PT
Traffic Volume (vph)	50	66	542	63	54	323
Future Volume (vph)	50	66	542	63	54	323
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frt	0.92		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1683		1837		1770	1863
Flt Permitted	0.98		1.00		0.20	1.00
Satd. Flow (perm)	1683		1837		375	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	72	589	68	59	351
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	126	0	657	0	59	351
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	9.4		33.6		40.8	40.8
Effective Green, g (s)	9.4		33.6		40.8	40.8
Actuated g/C Ratio	0.14		0.49		0.59	0.59
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	229		894		286	1101
v/s Ratio Prot	c0.07		c0.36		0.01	c0.19
v/s Ratio Perm					0.11	
v/c Ratio	0.55		0.73		0.21	0.32
Uniform Delay, d1	27.8		14.1		8.9	7.1
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	2.8		3.2		0.4	0.2
Delay (s)	30.7		17.3		9.3	7.3
Level of Service	C		B		A	A
Approach Delay (s)	30.7		17.3			7.6
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			15.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			69.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			55.8%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

3: North Avenue & North Street

02/24/201

				
Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	73	379	54	630
v/c Ratio	0.28	0.32	0.08	0.46
Control Delay	23.5	11.3	5.6	8.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.5	11.3	5.6	8.1
Queue Length 50th (ft)	14	33	3	66
Queue Length 95th (ft)	#71	215	26	300
Internal Link Dist (ft)	263	11		472
Turn Bay Length (ft)			75	
Base Capacity (vph)	265	1239	728	1506
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.31	0.07	0.42

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: North Avenue & North Street

02/24/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑		↘	↑
Traffic Volume (vph)	22	45	316	33	50	580
Future Volume (vph)	22	45	316	33	50	580
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1667		1839		1770	1863
Flt Permitted	0.98		1.00		0.42	1.00
Satd. Flow (perm)	1667		1839		788	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	49	343	36	54	630
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	73	0	379	0	54	630
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	3.2		23.9		30.0	30.0
Effective Green, g (s)	3.2		23.9		30.0	30.0
Actuated g/C Ratio	0.06		0.48		0.60	0.60
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	107		882		516	1122
v/s Ratio Prot	c0.04		0.21		0.00	c0.34
v/s Ratio Perm					0.06	
v/c Ratio	0.68		0.43		0.10	0.56
Uniform Delay, d1	22.8		8.5		4.4	5.9
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	16.5		0.3		0.1	0.6
Delay (s)	39.3		8.8		4.5	6.6
Level of Service	D		A		A	A
Approach Delay (s)	39.3		8.8			6.4
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			9.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			49.8		Sum of lost time (s)	19.0
Intersection Capacity Utilization			43.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Phasings

3: North Avenue & North Street

02/24/2017

	↙	↑	↘	↓	
Lane Group	WBL	NBT	SBL	SBT	Ø9
Protected Phases	8	2	1	6	9
Permitted Phases			6		
Minimum Initial (s)	6.0	10.0	6.0	10.0	5.0
Minimum Split (s)	11.0	15.0	10.0	15.0	18.0
Total Split (s)	14.0	48.0	10.0	58.0	18.0
Total Split (%)	15.6%	53.3%	11.1%	64.4%	20%
Maximum Green (s)	9.0	43.0	6.0	53.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	0.0	1.0	1.0
Lead/Lag		Lag	Lead		
Lead-Lag Optimize?		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	1.5	2.0	3.0	2.0	2.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	Min	None
Walk Time (s)					7.0
Flash Dont Walk (s)					6.0
Pedestrian Calls (#/hr)					20
90th %ile Green (s)	9.0	43.0	6.0	53.0	13.0
90th %ile Term Code	Max	Max	Max	Hold	Ped
70th %ile Green (s)	9.0	41.3	6.0	51.3	13.0
70th %ile Term Code	Max	Gap	Max	Hold	Ped
50th %ile Green (s)	9.0	25.2	6.0	35.2	0.0
50th %ile Term Code	Max	Gap	Max	Hold	Skip
30th %ile Green (s)	9.0	26.8	0.0	26.8	0.0
30th %ile Term Code	Max	Dwell	Skip	Dwell	Skip
10th %ile Green (s)	7.4	27.2	0.0	27.2	0.0
10th %ile Term Code	Gap	Dwell	Skip	Dwell	Skip

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 64.6
 Control Type: Semi Act-Uncoord
 90th %ile Actuated Cycle: 90
 70th %ile Actuated Cycle: 88.3
 50th %ile Actuated Cycle: 54.2
 30th %ile Actuated Cycle: 45.8
 10th %ile Actuated Cycle: 44.6

HCM Signalized Intersection Capacity Analysis 3: North Avenue & North Street

02/24/201

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T		L	T
Traffic Volume (vph)	51	66	544	64	54	327
Future Volume (vph)	51	66	544	64	54	327
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frt	0.92		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1684		1836		1770	1863
Flt Permitted	0.98		1.00		0.20	1.00
Satd. Flow (perm)	1684		1836		371	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	72	591	70	59	355
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	127	0	661	0	59	355
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	9.4		33.7		40.9	40.9
Effective Green, g (s)	9.4		33.7		40.9	40.9
Actuated g/C Ratio	0.14		0.49		0.59	0.59
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	229		895		284	1102
v/s Ratio Prot	c0.08		c0.36		0.01	c0.19
v/s Ratio Perm					0.11	
v/c Ratio	0.55		0.74		0.21	0.32
Uniform Delay, d1	27.9		14.2		8.9	7.1
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	2.9		3.2		0.4	0.2
Delay (s)	30.8		17.4		9.3	7.3
Level of Service	C		B		A	A
Approach Delay (s)	30.8		17.4			7.6
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			15.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			69.1		Sum of lost time (s)	19.0
Intersection Capacity Utilization			56.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						



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Chapin Spencer
DIRECTOR OF PUBLIC WORKS

Norman J. Baldwin, P.E.
ASSISTANT DIRECTOR OF PUBLIC WORKS

Date: April 25, 2017

To: City of Burlington Planning & Zoning Department
Jack Wallace, Zoning Permit Applicant

From: Chapin Spencer, Director of Public Works
Norman J. Baldwin, P.E.-City Engineer/Assistant Director – Technical Services
Megan Moir, Assistant Director – Water Resources

C.C. Laura K. Wheelock, P.E.-Public Works Engineer, DPW

Subject: 17-0755CA/CU; 235 Penny Lane; City of Burlington/Burlington Harbor Marina, LLC

At the Development Review Board held on Tuesday, March 21, 2017 there were a number of questions submitted by the Design Review Board to Public Works Technical Review Staff for consideration and written responses in preparation for the upcoming May 2, 2017 DRB Hearing.

Here are the questions that were submitted to Public Works Technical Review Staff from the DRB.

1. DPW's review of the Traffic Study
2. The Marina's and Sailing Center's Request for Parking Waivers;
3. The State floodplain person's comments on a) the marina's connection to municipal water and sewer and b) presence of an Underground Storage Tank (UST);
4. DPW's plans for management of the shared parking lots; and
5. The availability of handicap parking spaces to serve both the marina and the fishing pier.

In associated numerical order here are the responses by Public Works Technical Review Staff to each of the questions:

1. **DPW's review of the Traffic Study** - The Department of Public Works has reviewed the Traffic Impact Study prepared by Resource Systems Group (RSG) dated September 14, 2017. The

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Department has had the opportunity to discuss the details of the Traffic Impact Study with the author of the study, Jon Slason of RSG and the Department of Public Works is satisfied with RSG's conclusions.

In addition, the Department has reviewed Planning & Zoning staff comments and draft conditions regarding the question of pedestrian connectivity from the East Lot to the Plaza. The proposed sidewalk adjacent to the East Lot should continue across the East Lot driveway entrances per DPW policy. Further west, adjacent to the Water Plant Pump Building, the Department has concluded that an at-grade striped walkway provides adequate access and safety for pedestrians given the projected volume of traffic is anticipated to be less than the existing condition therefore fewer conflicts.

- the number of parking spaces adjacent to the fishing pier parking lot has been reduced and converted into recreational space
- the Community Sailing Center(CSC) activities are anticipated to be relocated further north to their new facility under development.

We also requested crash data from the Burlington Police Department and their records indicate no crashes involving a pedestrian at this location in their current reporting system (going back to late 2011). Lastly, the Department finds the at-grade striped walkway preferable to a curbed concrete sidewalk given the potential construction impacts of a curbed sidewalk on the critical underground water pipes connecting the two Water Plant buildings.

2. The Marina's Request for Parking Waiver - The City supports the Marina's waiver request per their submission.

3. The State floodplain person's comments on the marina's connection to municipal water and sewer and b) presence of an Underground Storage Tank (UST);

a. As provided in an email to Scott Gustin by Assistant Director Megan Moir on March 21, the concerns that the State Floodplain person cites are Burlington standards 4.5.4(f)8.F & G related to the Natural Resource Overlay District which we do not usually specifically screen for in our review:

- F. Water Supply Systems: New and replacement water supply and sanitary sewer systems shall be designed so as to prevent the infiltration of floodwaters into the systems and discharge from the systems;
- G. On-Site Waste Disposal Systems: On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding;

Senior Water Resources Engineer Steve Roy has provided our typical review of on-land water and wastewater connections, including the new hydrant and water and wastewater capacity letters (see attached for his Water and Sewer System Review Checklists).

In light of F, we would suggest that the developers specify a water proof cover in their pump station design so as to prevent additional water from infiltrating into our system. There is no on-site Waste Disposal System, so item G is not relevant.

b. Regarding the DRB's request for review by DPW's Water Resources Division of the Underground Storage Tank (UST) on site at the Marina, DPW does not have direct purview over the underground storage tank. It is our understanding that this UST needs to be registered and permitted by the State of Vermont Department of Environmental Conservation Storage Tank program. The State program would have purview over any

design requirements in addition to the “strap downs” that the Flood Plain Manager mentioned. As such, the applicant should obtain/or should have obtained, a UST permit from that program.

While it is of some concern due to its proximity to the shore of Lake Champlain, the Marina has submitted and we have reviewed (though also not in our authority to approve) the Spill Prevention Plan and provided comments which would address any spills from the tank. Our direct concerns (from a drinking water standpoint) are mitigated by the fact that our water intake is at a substantial distance off shore. Additionally, we do have means to provide additional treatment for our water should any spill whether from this tank or a boating vessel occur.

4. **DPW’s plans for management of the shared parking lots** - The City will maintain ownership of the proposed 68 space East Lot after construction. Therefore, the Department of Public Works will be responsible for management of the lot. As noted above, the City supports the Marina’s request for a waivers based on their submissions and testimony. The operating season for the Marina goes from May 15 to October 15. The traffic study supports the arrangement to be memorialized in a Parking Agreement between the City and the Marina wherein the Marina will utilize 42 designated parking spaces in the East Lot on weekends and holidays during their operating season and 23 parking spaces during their operating season on non-holiday weekdays. The Department of Public Works will then manage and operate the balance of the facility (to encompass the entire lot during the Marina’s off-season) consistent with its management practices for the City’s surface public parking lots.
5. **The availability of handicap parking spaces to serve both the marina and the fishing pier** – Pursuant to the lease agreement, the Burlington Harbor Marina must provide 4 accessible spaces at the proposed parking lot adjacent to the fishing pier titled “The Plaza”. The accessible spaces will be available to the public on a first come first serve basis and will not be restricted to Marina use only. The new East Lot will also have additional accessible spaces.

Public Works Technical Review Staff will be in attendance at the upcoming May 2, 2017 DRB Hearing to answer any follow up questions.

Should you have any questions please contact us at spencer@burlingtonvt.gov, nbaldwin@burlingtonvt.gov or mmoir@burlingtonvt.gov. Thank you.

Burlington Development Review Board

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Austin Hart
Brad Rabinowitz
Israel Smith
AJ LaRosa
Geoff Hand
Alexandra Zipparo
Wayne Senville
Jim Drummond, (Alternate)
Robert Purvee, (Alternate)



BURLINGTON DEVELOPMENT REVIEW BOARD Tuesday, May 2, 2017, 5:00 PM Contois Auditorium, City Hall, 149 Church St, Burlington, VT Minutes

Board Members Present: Austin Hart, Brad Rabinowitz, Geoff Hand, Israel Smith, AJ.LaRosa, Alexandra Zipparo, Wayne Senville, Jim Drummond (Alt)
Board Members Absent: R.Purvee (Alt)
Staff Present: Scott Gustin, Ryan Morrison, Anita Wade

I. Agenda

II. Communications

III. Minutes

IV. Consent

1. 17-0792CA/CU; 410 North Street (RL, Ward 1E) Scott Goodwin

Add a 165 sq. ft. addition onto accessory dwelling unit. (Project Manager, Ryan Morrison)

A.Hart: assume you have you seen staff conditions and recommendations.

S.Goodwin: correct.

A.Hart: asked if members of the public are request to speak. None.

W.Senville: motion to approve staff findings and recommendations.

B.Rabinowitz: seconds the motion.

Board Vote: 7-0-0

2. 17-0896SD; 311 North Ave (RM-W, Ward 4N) BCCH

Review of Final Plat for 9 lot subdivision (3 existing and 12 proposed lots).
(Project Manager, Scott Gustin)

G.Hand: recused from this item.

A.Hart: no public members of the public request to speak. Swears in applicant. Asks if he has seen staff comments.

E.Farrell: yes.

S.Gustin: preliminary plat review had a single condition on lot lines being straight. The plat was submitted the same and felt this needed to be pointed out to the Board.

A.Hart: what are the specific concerns for staff.

S.Gustin: concerns about lot 9, 3, and 2 being irregular lots.

E.Farrell: lot lines are perpendicular and were approved with the master plan previously. This reflects the plan we presented prior that was approved by the Board.

M.Murray: owner of property on Shelburne Rd. Said FOIA letters were sent to the Mayor and Board and HUD about too many units being placed near the water, overbuilding on a slope, and the dirt. She gave letters to the Board.
A.Hart: closed public hearing.

V. Public Hearing

1. **17-0825CA/MA; 85 North Ave (NMU, Ward 3C) Catamount/Lakeview, LLC**
Review construction of a 43-unit residential building with associated parking and site improvements. (Project Manager, Scott Gustin)

AJ.LaRosa: recused from this item.

A.Hart: swears in applicant and interested persons.

E.Hoekstra: slide presentation of area in NMU. Proposing multifamily mixed use development with no direct frontage on North Ave previously owned by Burlington College. Showed parking easement that benefits COTS and where the proposed building lot can be sited. Indicates the differences and changes from previous presentation, where the current proposal is a smaller scale with 43 units and 53,000 sq ft building consisting of studio, one bedroom and two bedroom. Indicates vehicular travel patterns, pedestrian approaches, and crosswalks and sidewalks. Parking to be open. Spoke of infrastructure connections and adequate capacity. Worked out with the Fire Marshall about maintaining the path of travel for emergency vehicles. Discussed elevations, entryways; parking levels.

W.Senville: questions the structure of the parking level.

E.Hoekstra: part of building is on slab foundation and part on columns. The hillside is stable on sandy soil.

W.Senville: what sort of materials.

E.Hoekstra: screening of headlights, screened ceiling lights in garage, showed parking levels and sectional aspects of the building. Refers to site plan, landscaping, tree locations,

B.Rabinowitz: location of trees.

E.Hoekstra: fair amount of trees will remain and will be post construction stabilization.

A.Hart: is building finalizing the retaining walls and review by the City

E.Hoekstra: DPW is looking at substructural with a rigorous review process.

A.Hart: stormwater offsets explanation; and most handled with infiltration; need more detail

E.Hoekstra: overflow has dedicated line; challenge is the combined line on North Ave. Working with DPW to reduce flow of stormwater with new infiltration off site. Conservation around Police Station and Battery Park, where the infiltration site will be installed.

A.Hart: building materials.

D.Goltzman: discusses mixture of materials.

W.Senville: questions on traffic flow.

E.Hoekstra: primary is North Ave. Majority of parking is accessible to building.

W.Senville: access from Lakeview Terrace.

E.Hoekstra: don't think most people will travel down North Ave. Peak trips are few during commuter times.

W.Senville: traffic report mentions number of left hand turns and people going down Lakeview Terrace to make the turn.

E.Hoekstra: don't think this will be adverse impact.

A.Zipparo: connectivity and circulation of traffic concerns.

E.Hoekstra: shows pedestrian access and ROW.

A.Zipparo: want to know more about the parking area and where traffic flow from the building.

W.Senville: would like to hear about DPW comments.

A.Hart: materials on site designated as hazard site.

N.Baldwin: spoke about program from DEC, phase 1 and 2 sampling and testing. DEC will review before and at the end.

A.Hart: asks for members of the public who may want to speak.

J.VanDriesche: part of an advocacy group for better places for walking and biking. Would like more information on bike parking and bike storage with secure location. Supportive of viable transportation options.

A.Zipparo: 16 long term and 8 short term bike spaces doesn't seem not adequate.

JTadrice: looking into creating more strategies for bike parking and long-term storage.

J.George: speaking as a neighbor from North Ave would like to see visitor parking issues provided by the contractor to have parking in other areas offsite.

A.Farrell: lengthy construction with COTS and would like to shorten time with this project and plan for this construction.

Resident: resident of Lakeview Terrace would like Board to view area and take notice of entry way. Questions about moving trucks and delivery trucks. Methods of no shipping, receiving and unloading in this plan; how are trucks entering. Want to build all the things to support the community or else the area will become dangerous with transportation concerns for children playing in area. This building supports dogs with no design solution to relieve the dogs and puts it out of balance handling waste.

R.Markey: resident and also works for COTS. With our plan we brought to the Board was in spirit of NMU with commercial on lower floor and housing on top floor. Reads NMU requirements. Decided on having services for community, where half of staff can bike or walk to work and could have created 5 or more affordable units. What are the ground rules? Consider the precedent the Board is setting and what for what purpose. What is the meaning and purpose of uses if not everyone is following them.

M.Sherman: not enough said about parking and traffic. Number of cars owned by residents doesn't make sense. Matter of time before an accident. The parking on Lakeview Terrace is impossible and the number of cars are not realistic. In favor of more housing but needs to be held to high standard like Lakeview Terrace. Asks Board concern about traffic, safety and parking.

L.Tierney: lived 40yrs in area. Skate park is nice but noisy, traffic issues, dogs in garden all the time, dog runs placed on the roof in other areas with self-clean components, place garbage behind the building not next to building. There are over 20 kids on our street with some people not paying attention driving down Lakeview Terrace. This is not a stable hillside. We've lost between 6 to 8 feet of land.

S.Bushor; sworn in. Speaking as a resident wants the focus on environmental change and frequency of 100 year storm and stability of bank. Concern about structure hanging over posts and look at weather changes and also have had tremors in area. Not sure where structure could slide to. Feel DRB hasn't had questions answered and need to continue hearing.

I.Goldstein: 65 Lakeview Terrace resident feels it is a nice design, but bad logistics. It cuts off Depot St and needs significant review

M.Tierney: chairman of advisory on Historic preservation and looking for rationale for historic; multi facet of neighborhoods. Packard loft area changes and ecology. Problems with dog droppings in leaves, driving legal limit is too fast at 25mph. Not against this project but sense of neighborhood and community is being eroded. Structurally needs to be resolved. Feels preliminary sense of application.

Resident: access to Depot St and only access to water; special crossing signals to reach water and old north end

D.Goltzman: 135 Lakeview Terrace. Disagrees with most neighbors. Main concern should be about state of economy in VT and Burlington and believe the need for housing. If we slow down housing projects and delay it can slow economic development. Nice design and aesthetics and need to add taxpayers into Burlington; welcome into Burlington and strive to maintain.

M.Murray: lives in Montpelier and own property on Shelburne St. COTS had overrun due to polluted soils and this will be similar. DPW will work with developer looking at traffic. Stormwater and sewer combined capacity up North Ave. Funds for project is concern

M.Sherman: sworn in. Licensed B&B owner. Parking is challenge with traffic is picking up. Pets are a problem at Packard Loft. Would like to see new development have pet run. Trash placement is concern. Underground parking should dedicate carshare spaces.

E.Spiegel: sworn in. Resident lives two blocks away said Depot ST and impact of additional traffic as a primary connector to waterfront has a lot of activity and busy convergence. Parking issues. and concern for older trees being removed. Where will 43 bikes be parked.

P.Reilly: sworn in. Beauty of the view and now will be looking at parking area.

A.Hart: will continue this for traffic and study from DPW. Continue to another date.

E.Hoekstra: close to addressing this with DPW.

S.Gustin: next available date is June 6th
 A.Zipparro: would like to know more about erosion control.
 B.Rabinowitz: adds would like to see how this impacts plan
 A.Hart: more information on traffic circulation, traffic up Lakeview Terrace and mitigate high speeds.
 W.Senville: asks for loading and deliveries for DPW to address Depot ST.
 A.Hart: whether spaces sufficient or spill over on Lakeview Terrace, consequences of dogs.
 B.Rabinowitz: number of bedrooms
 A.Hart: come back June 6th and send information in advance for Board Letter Handout from neighbor to Board.

2. 17-0755CA/CU; 235 Penny Lane (DW-PT, Ward 3C) City of Burlington/Burlington Harbor Marina, LLC

Continued review to construct marina, parking lot, and related site improvements.
 (Project Manager, Scott Gustin)

AJ.LaRosa: recused
 A.Hart: only seeking what is happening on the land and not waterfront. Swears in applicant and interested persons.
 A.Hart: traffic, management, spaces and other issues unanswered.
 J.Wallace: following up on responses from the City.
 C.Spencer: goes over aspects of the letter sent to Board; the traffic study; satisfied with conclusions and guidance with east lot and plaza relates to pedestrian sidewalk; sufficient due to less traffic in this area 2) parking waiver 3) UGS tanks referred to VT and their role 4) management of shared parking, 68 spaces on east lot
 A.Hart: how will this lot be managed?
 C.Spencer: kiosks or meters with signage clearly conveyed.
 B.Rabinowitz: does marina have card or status?
 C.Spencer: designated spaces.
 A.Hart: need for control and consequences since very desirable parking spaces.
 C.Spencer: handicap accessible spaces will be first month first serve.
 A.Hart: flood hazard comments from state where it connects to city system are they secure and safe.
 M.Moir: thorough review but not offshore. Working with developer on piping system.
 A.Hart: would like to know general system that connection is secure and safe.
 M.Moir: cannot approve UST Steve: will not have adverse impact on system
 N.Baldwin: will follow up on protections are complete and sensible
 J.Wallace: two comments and questions about conditions; condition 8, flood hazard area; request condition 8c and 8e say nonapplicable. Confusion on how much of project in special flood area;
 S.Gustin: point out these are required as part of CDO if it's a sliver or more.
 A.Hart: condition is that nothing applicant can do to avoid crossing area.
 J.Wallace: 8f and 8g but 8e no onsite waste disposal and only water supply pipe
 S.Gustin: suggests Board leave in 8C
 J.Wallace: revise 3.2 performance bond
 N.McKaig: performance bond and structure of development agreement is for park area and feel we have enough assurances
 J.Wallace: bonding, for two years of maintenance going to City and City is taking over; it is in the CDO.
 B.Rabinowitz: questions parking approved for sailing center.
 S.Gustin: parking at Moran for sailing center and will come in with separate parking arrangements.
 W.Senville: Moran permit, outstanding zoning permit. How does Board grant approval with outstanding zoning permit?

S.Gustin: this is mostly for sailing center who will be finding own parking, apply separate. May have temporary parking or amendment for parking.

Richard: city attorney and fact witness for city said solution for temporary CO for sailing center.

Coming back in August for amending zoning permit to finalize what the waiver request will be. Temporary CO and amend before original is closed out. City will work with them. This allows DRB to proceed.

B.Rabinowitz: spaces are not yet accepted into public ROW.

Richard: sailing center waiver will satisfy for DRB.

Applicant: comfortable moving forward into building in the summer. Will come in with long term solution to DRB.

A.Hart: asks if anyone from public would like to speak.

S.Bushor: City Councilor Ward 1 asks how many spaces remain and if there has been any ADA complainant. State weighed in on spill prevention plan? DRB and DPW consider this drinking water for Burlington? Concerns about condition 4, with questions on parking waiver. Final conditions more expansive to remedy.

J.Wallace: Four ADA spaces in same area as now at fishing pier with 15 minute drop off. Reviewing spill prevention plan which goes to Feds and is filed, recorded and administered.

W.Senville: are long waiting lists and why seasonal?

J.Wallace: greater demand for transient slips; reduce waiting list and encourage transient spaces;

W.Senville: does Burlington get priority?

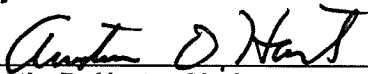
J.Drummond: is there a pedestrian walkway and demarcations for bike lane and separation.

N.Baldwin: Traffic reduced and not seen accidents. Challenge with the excavation of site near water

A.Hart: closed public hearing.

VI. Other Business

VII. Adjournment



Austin D. Hart, Chairperson of Development Review Board

June 6, 2017
Date



A.Wade, Zoning Clerk, Development Review Board

6/5/17
Date

Plans may be viewed in the Planning and Zoning Office, (City Hall, 149 Church Street, Burlington), between the hours of 8:00 a.m. and 4:30 p.m.

Participation in the DRB proceeding is a prerequisite to the right to take any subsequent appeal. Please note that ANYTHING submitted to the Planning and Zoning office is considered public and cannot be kept confidential. This may not be the final order in which items will be heard. Please view final Agenda, at www.burlingtonvt.gov/pz/drb/agendas or the office notice board, one week before the hearing for the order in which items will be heard.

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