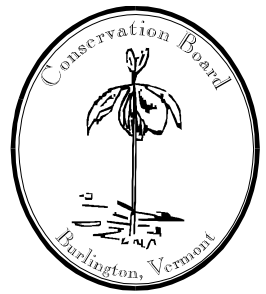


Burlington Conservation Board

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

Matt Moore, Chair
Will Flender, Vice Chair
Scott Mapes
Don Meals
Jeff Severson
Miles Waite
Damon Lane
Zoe Richards
Stephanie Young



Conservation Board Meeting Public Notice

January 23, 2017 at 5:30 PM
Community Room – Burlington Police Department
1 North Avenue

Amended Special Meeting Agenda

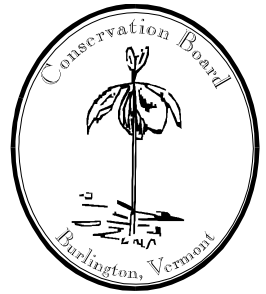
- I. Minutes (5:30)** – Accept minutes from January 9, 2017 meeting
- II. Board Comment (5:35)**
- III. Public Comment (5:45)**
- IV. Project Review (5:50)**
 - 1. 17-0669CA/MA; 29 Starr Farm Beach (Ward 4N, RLW) David Porteous**
Construct stone seawall, slope stabilization, and repair of stairs
 - 2. 17-0388CA/MA; 80 Colchester Ave (Ward 1E, I) Eastern Development Corp.**
Construct 75-unit residential building and related parking and site improvements
(continued review)
 - 3. 17-0643CA/MA; 400 Pine St (Ward 5S, ELM) Howard Space Partnership**
Demolish 2 warehouse buildings and construct new mixed use building
- V. Adjournment (7:30)**

The City of Burlington will not tolerate unlawful harassment or discrimination on the basis of political or religious affiliation, race, color, national origin, place of birth, ancestry, age, sex, sexual orientation, gender identity, marital status, veteran status, disability, HIV positive status or genetic information. The City is also committed to providing proper access to services, facilities, and employment opportunities. For accessibility information or alternative formats, please contact Human Resources Department at 865-7145.

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Conservation Board Meeting Minutes

Monday, January 9, 2017 – 5:30 pm
Fletcher Free Library – Pickering Room
135 College Street

Attendance

- **Board Members:** Zoe Richards (ZR), Matt Moore (MM), Jeff Severson (JS), Will Flender (WF), Damon Lane (DL), Miles Waite (MW), Scott Mapes (SM), Stephanie Young (SY), Don Meals (DM)
- **Absent:**
- **Public:** Joel Banner-Baird
- **Staff:** Scott Gustin (Planning & Zoning)

MM, Chair, called the meeting to order at 5:32 p.m.

Minutes

December 5, 2016 meeting minutes

SM noted on pg. 5, bottom paragraph, 2nd sentence, “disperse way” should be deleted and replaced with “out.”

JS noted on pg. 2 under JS, 2nd sentence should be “non-recusal” instead of “recusal.”

A MOTION was made by DM and seconded by MM:

Approve minutes of December 5, 2016 as corrected.

Vote: 9-0-0, motion carried.

December 19, 2016 meeting minutes

DL noted the motion at the end for Cambrian Rise – the project is not a model project. Intent is that CATMA membership could be a model for others.

WF, make clear where he took over as chair to make the record clear that MM recused.

A MOTION was made by MM and seconded by DL:

Approve minutes of December 19, 2016 as corrected.

Vote: 8-0-1 (JS abstained), motion carried.

Board Comment

SG noted the sign-in sheet.

Public Comment

None.

The programs and services of the Dept. of Planning and Zoning are accessible to people with disabilities.
For accessibility information call 865-7188 (865-7142 TTY).

Open Space Subcommittee

ZR, the subcommittee did not meet this month. In February, she'd like to delve into the trails discussion. She's spoken with a number of folks – Nick Warner, Alicia Daniels, Jesse Bridges, Dan Cahill – since their last meeting. She'd like to see the Conservation Board take a leadership role. She also spoke with Brian Lowe of the Mayor's Office.

MM said he totally supports what ZR is working on.

MW asked if the Board could initiate an effort that might entail use of the Conservation Legacy Fund. JS, yes, it's possible.

Project Review

- 1. 17-0662CA/MA; 75 Cherry St (Ward 3C, D) Devonwood Investors, LLC / PKSB Architects, PC**
Mixed use redevelopment of the existing Burlington Town Center mall site and associated lot line adjustments

Don Sinex, Brian Dunkiel, Kevin Worden, Jesse Beck, William Fellows, David Salidino, Michael Willard, Jay Fayette, Nick Principle, Kurt Mueller, Jeff Zweber, Kevin Morrissey, Art Klugo appeared on behalf of the application.

Brian Dunkiel asked about whether MW would recuse himself. MW said he's done consulting for a neighboring landowner and is still working in that capacity. He does not know whether that would constitute a conflict in this case. He asked Board members for their thoughts.

ZR, we can end up with very skilled people stepping away from project review. We don't want to recuse all of the expertise off of the board.

WF asked if MW was employed related to this project. MW said he's involved in soils analysis.

Brian Dunkiel referred to the Board's bylaws about public perception of a conflict of interest. He said MW's work is germane to the pending project and could affect the Board's recommendation to the DRB. He thinks the conflict is clear and requests that MW recuse.

MW agrees to recuse. His judgement would not be clouded by his work. He will recuse at Mr. Dunkiel's request.

JS respects MW's decision but does not see a clear conflict of interest. ZR agreed. Mr. Dunkiel said he wants the process to be as clean as possible.

MW formally recuses himself.

Don Sinex overviewed the project.

William Fellows touched on the current status of the project – its scope and content. The garage has been scaled down. Since sketch review, phase 2 is gone, liner apartments on Bank and Cherry Street have been introduced, and the northern buildings on the base of retail, parking, and residential have been reduced down to 2, rather than 3, elements. The internal mall is gone. All of the retail faces outward towards the streets. Mr. Fellows overviewed the present exterior and interior layout of the proposed building. He noted the green roof as part of the green space requirement for development within the downtown mixed use overlay.

DM, is the roof a "green roof" in the technical sense? Mr. Fellow, yes. Mr. Fellows went on to point out the rooftop PV array.

Jesse Beck noted that the project is required to meet LEED "gold" standards. He laid out the building energy efficiency systems to the Board. All of the rooftop mechanical equipment will be enclosed. He

noted that the 10% ordinance requirement is being met with proposed green roofs – 10” deep sedum roof tray systems similar to that at the airport.

JS asked about the 10%. Mr. Beck said that 10% of the total site needs to have green space. Green roofs may be used to meet that requirement.

Kevin Worden summarized onsite stormwater management. Right now, about 1/3 of site runoff goes into the MS4 system. The rest goes into the combined system. As proposed, the project meets and exceeds the city’s and state’s permit requirements. The entire site will be taken out of the combined system and directed into the separate MS4 system. The city standards require consideration of the site as a “green field” as opposed to redevelopment of an already urbanized site. Reduced rate and volume, separation of roof runoff, and onsite storage are addressed in the stormwater management proposal. SM, is this in addition to the application materials? Mr. Worden, it is enhanced information recently compiled. We have also considered the “Great Streets” initiative for guidance.

Mr. Worden noted that under proposed conditions, new streets will be established. He noted proposed drainage patterns and the proposed green roofs. The green roofs will absorb 1’ of rain water. Permeable pavers will be set at ground level for infiltration. Large below grade tanks will collect runoff from the roads and roofs. Sediment will settle out, and stormwater will discharge at a controlled rate. A sand filtration system will be integrated into the system to provide water quality treatment for 100% of the site prior to discharge from the site. Mr. Worden pointed out a new rain garden along the street. The project will see a reduction in runoff even with the 100-year event.

SM, the flow calculations are based on 3.5 acres of impervious? Mr. Worden, yes, it’s about 3.5 including the buildings and new streets.

DM, the 3 tanks are entirely closed. There’s no reduction in volume. Mr. Worden, correct. Volume reduction is from the green roofs.

Mike Willard addressed the proposed landscaping. In large part, it amounts to new street trees. The proposal is consistent with the “Great Streets” initiative. They have worked extensively with the City Arborist. There will be large soil volumes for all of the new trees. Stormwater absorption will be enhanced. JS, does that mean a bigger, deeper hole? Mr. Willard, yes. As proposed, the trees will have 400-800 cubic feet of soil. Two varieties and red maples, a ginkgo, and an elm tree species are proposed. Street lighting will be BED city standard with LED lamps.

Kurt Muller, with Johnson Company, addressed soils. The applicant has collaborated with VT DEC for over a year now on data gap analysis and a soil sampling plan. Site investigation will take place in early 2017. DEC will review and approve soil management measures. Mr. Muller noted existing urban soil concerns include PAH’s and lead. At other recent construction sites in Burlington, PAH’s in excess of the standard are much more common than lead. The project will minimize generation of excess soil.

WF, what kind of soils do you expect to find? Mr. Muller said that the site was redeveloped in the early 1970’s, and a significant amount of soil was removed from the site then. It’s possible that the soils could be clean. That said, atmospheric deposition may result in PAH’s in the soils.

JS would like to know the information behind the soils removal estimates associated with the originally proposed underground garage. Mr. Worden answered that the sketch plan numbers were general. Mr. Fellows said that the garage would have been \$57M in addition to the unknown cost of soils removal and disposal. Mr. Sinex said that if soils were contaminated, an additional \$23M may have been needed. The project cannot support that cost. He also noted that an estimated 9 months of trucking would have been required to haul away that much soil.

MM noted topics to address:

- Stormwater
- Landscaping/street trees

- Bikes/paths
- Open space
- Environmental issues/impacts on natural resources
- Green building category under the new overlay district

MM, has the city stormwater program reviewed this? Mr. Worden, yes, they've reviewed it. That have not yet issued a final approval. The proposal meets and exceeds Chapter 26, the new downtown overlay zone, and the state stormwater requirements.

WF, clogging of pervious pavers has been a problem in the past. Has the applicant discussed their utilization with the DPW? Mr. Worden said there have been ongoing meetings. Another is scheduled tomorrow. The city will take over maintenance as public streets. He will recommend that no sand be used to avoid clogging. Salt may need to be avoided as well. Pervious concrete installations have been failed. Pavers with pervious voids between perform better and will be used here.

SM, it's good to see that a large chunk is being taken out of the combined system. Are we comparing to 3.5 acres of meadow? Mr. Worden, yes. SM, is a 90-15 state stormwater permit need? Mr. Worden, yes. SM, it looks like a small percentage of runoff will go to the combined system. Please clarify. Mr. Willard noted that it's the small portion of the new city streets. It's offset by performance elsewhere and results in a net 0 contribution to the combined system.

JS requested that DPW's approval is sent to BCB. MM, do you expect approval prior to DRB? Mr. Worden, yes.

DM, a particular kind of green roof was mentioned earlier. Please provide specifics. You seem to be relying on the green roof to provide attenuation. Mr. Worden addressed the green roof open space requirement. No one anticipated lawn on this downtown site. The green roof will meet the space requirement and will also absorb and evapotranspire rain water. DM, volume reduction through evapotranspiration is not considered in the stormwater calculations. Mr. Worden said that green roofs, tree wells, rain gardens, and pervious pavements are all working towards volume reduction. DM, are any under drained? Mr. Worden, the green roof is. The pervious pavers are not fully designed yet, but they will connect with the tree wells. Rain gardens will likely have some drainage to capture overflow. DM, just concerned that excessive under-draining negates their volume benefits. Mr. Worden, the green roof is not accounted for in the stormwater model for volume reduction. It's icing on the cake. The model will be further refined in the state stormwater process.

DL, what are you proposing for the rain garden? Mr. Worden, the curb design along the new street will direct runoff into it.

JS, what about EPSC? There is potential for contaminated soils onsite. The EPSC lacked diagrams noting how/where contaminated soils would be stockpiled onsite. Mr. Worden said that there will be a large hole in the ground below grade. Things will be moving along quickly. Soil stockpiles will not remain long. Mr. Mueller said that the soils management plan underway with VT DEC will specifically address this concern. Certain measures such as covering the soil will be built into the plan.

DM, regarding the LEED certification, the score sheet, a great number of criteria are locational and connectivity related. These are conditions that anything on this site would automatically meet. Of the remaining criteria, what features are proposed that result in gold level? Mr. Beck said the energy and efficiency systems of the building are significant. The building envelope, heating and cooling systems. DL, you'll meet code and then LEED in addition. Mr. Beck, we will exceed Efficiency Vermont standards. Mr. Worden said that location amounts to maybe 10% of the total. Stormwater management, water management, insulation, energy, PV, green roofs, lighting are all factors.

SY, are there points for water conservation? Mr. Beck, yes. The charrette tomorrow will address that, in part.

SM, how significant is the PV array relative to energy? Mr. Fellows, it reduces the project's electrical demand. Mr. Beck said we have a general expectation now, but it will be refined. Mr. Fellows said about 20% reduction of impacts on the grid is expected.

MM, are you going with LEED? Mr. Beck, yes, 100%.

DL, regarding a district heating system, how will the building be constructed to be compatible with such a system? Mr. Sinex, the building will be constructed to accept such a system. It will have a boiler system initially. There's no district system in place yet. A feasibility study is underway. DL asked about cooling. Mr. Beck said there will be cooling towers and heat pumps. DL, the south tower has a lot of glass. Are there specific plans for the south-facing windows? Mr. Fellows, we're looking at the details about how to shade, whether internally or externally. DL, it would be a shame if all of the solar gain had to be shaded out. Mr. Beck, we're promoting use of natural daylight. We need to consider what's going on inside the building.

DM, the bike parking table in the application seems to show a very low requirement. Mr. Fellows, the standards are from the city's zoning code. MM, is the minimum exceeded? Mr. Fellows, the minimum standards are met and exceeded. DM, encourages the applicant to enhance provision of bike parking facilities.

WF, noted the elevator with capacity for folks with bikes. Mr. Fellows replied that there are two points of access into the garage. Bike parking is on the second level

SM asked for description of vehicle, bike, and pedestrian circulation along the new city streets. Mr. Fellows noted the wide sidewalks for pedestrians (about 2X the typical width). The proposed roadway will be wide enough to accommodate bikes in addition to vehicles.

WF, is the proposed parking in compliance with the city's minimum parking standards? Mr. Fellows, the minimum requirement is just above 700 spaces. We are proposing slightly more than that – mid 700's. David Saladino noted that the parking is predicated on an urban shared use model.

JS, regarding traffic analysis, some supplemental information appeared to be missing. Mr. Saladino said the complete traffic study has been provided to DPW and P&Z. JS asked if air pollution is something that is considered under state standards. Mr. Saladino, the site is not considered a point source of air pollution. JS, regarding noise, the memo from VHB focused on the Burlington Noise Ordinance. Would there be a significant difference to meet the noise criterion under Act 250? Mr. Dunkiel, there's no specific state standard. The city's Noise Ordinance has a standard.

JS said the building height is an obvious concern. It was a very controversial item that touches on the scenic resources that are within the purview of this board. Mr. Beck noted that the height complies with the height limit established within the overlay. SG concurred that the proposed height is within the height limits established in the overlay.

Mr. Dunkiel advised the Board to focus comments on items to be considered by the DRB. He noted the form base code that was adopted as part of the zoning amendment. SG stated that Article 6 is specifically precluded from project review within the overlay. There are requirements as to dimensions, glazing, open space, stormwater, etc, but Article 6 design review standards are not considered.

DL asked about public access to the observation deck. Mr. Fellows noted the access point.

DM, finds a tremendous amount that is commendable about this project, but a lot of things are still evolving. He's a little troubled being asked to make a recommendation on something other than a final design. Can anyone give a sense of when everything will be nailed down? Mr. Fellows said he expects a DPW recommendation prior to DRB review in February. Mr. Beck said documents are being produced every day in order to move ahead.

JS concurred with DM. We've required final design from smaller projects. Mr. Worden said that the project has evolved for the better. As proposed, the project exceeds all of the applicable stormwater requirements. If there is concern about details as to meeting the standards, he can assure the Board that they are being met. He also noted DPW is a major factor here, as they will take over the new public infrastructure.

JS, will this information be wrapped up in short order? Can we preface our recommendation on having that information approved prior to DRB review? MM said with the overlay standards in place, there's not much room for comment unless they are way off. The standards are clear and require DPW review and approval.

DM is not willing yet to say that all of the standards have been met – the information is simply not there yet. He's willing to make a conditioned recommendation. MM said the overlay standards state exactly what needs to be done already.

JS, could the Board recommend approval subject to obtaining X, Y, & Z approvals?

SM, respects DM's comments relative to details. With the information presented today, he feels there are sufficient checks and balances in place to ensure the standards are met. Removal from the combined system is huge for a downtown development. Regarding stormwater, he feels we are in a position to make a recommendation to DRB. The requirements of the new zoning overlay are addressed in the application.

ZR, one of the goals of the stormwater program and the city's stormwater standards are to expressly articulate standards rather than leave to subjective review.

A MOTION was made by WF and SECONDED by SM:

Recommend approval to the DRB with the following condition:

- We strongly encourage the applicant and the DRB to significantly increase the number of bike parking spaces.

Discussion:

JS will not support the project as presented. His questions related to contaminants in the soils were because of the representations made in the Board's prior review. It was represented that soils were contaminated urban soils. Removal would be cost prohibitive. He learned tonight that underground parking would be cost-prohibitive in any event. The zoning language "strongly prefers" underground parking. Why would any applicant do anything different other than assert that it's too costly to bury parking? Burying the parking could drop the height by 50' – that would address concerns of thousands of people in Burlington.

MM, how many levels are above-ground? Mr. Beck, 3.

DM, concurs with JS's statement regarding precedent about avoidance of underground parking.

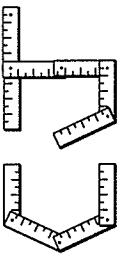
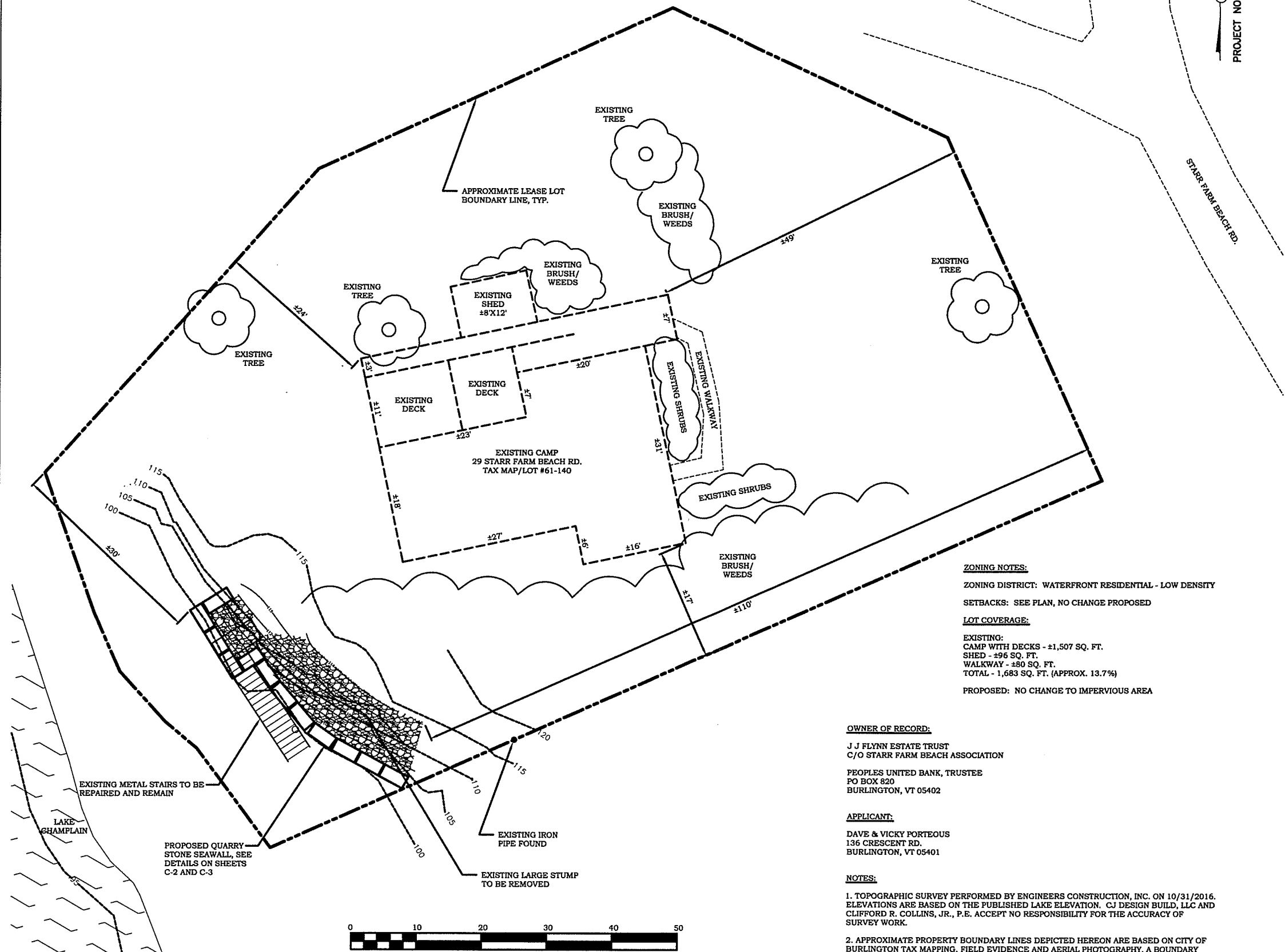
Vote: 7-1-1, motion carried.

Adjournment

The meeting adjourned at 8:21PM.

LIST OF DRAWINGS:

- C-1 OVERALL SITE PLAN
C-2 PARTIAL SITE PLAN
C-3 SECTION/PROFILE



Design Build

Construction and Remodeling from Conception to Completion
215 CURTIS AVE.
BURLINGTON, VT 05408
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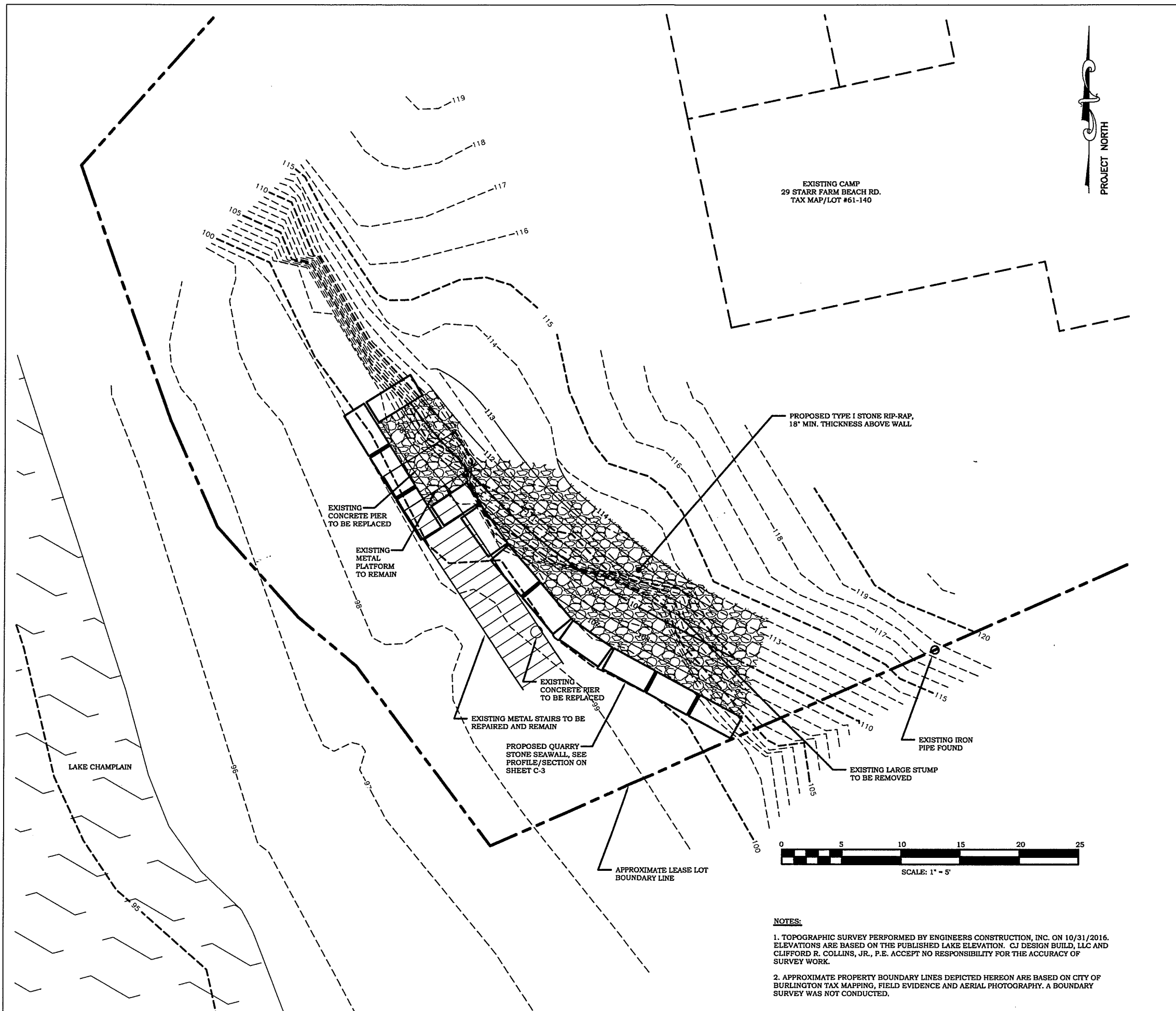
DEPARTMENT OF
PLANNING & ZONING

OVERALL SITE PLAN
PORTEOUS SEAWALL
29 STARR FARM BEACH RD
BURLINGTON, VERMONT

DATE: 12/21/2016
SCALE: 1"=10'
DRAWN BY: CRC/JGE

REVISIONS

C-1



NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY ENGINEERS CONSTRUCTION, INC. ON 10/31/2016. ELEVATIONS ARE BASED ON THE PUBLISHED LAKE ELEVATION. CJ DESIGN BUILD, LLC AND CLIFFORD R. COLLINS, JR., P.E. ACCEPT NO RESPONSIBILITY FOR THE ACCURACY OF SURVEY WORK.

2. APPROXIMATE PROPERTY BOUNDARY LINES DEPICTED HEREON ARE BASED ON CITY OF BURLINGTON TAX MAPPING, FIELD EVIDENCE AND AERIAL PHOTOGRAPHY. A BOUNDARY SURVEY WAS NOT CONDUCTED.

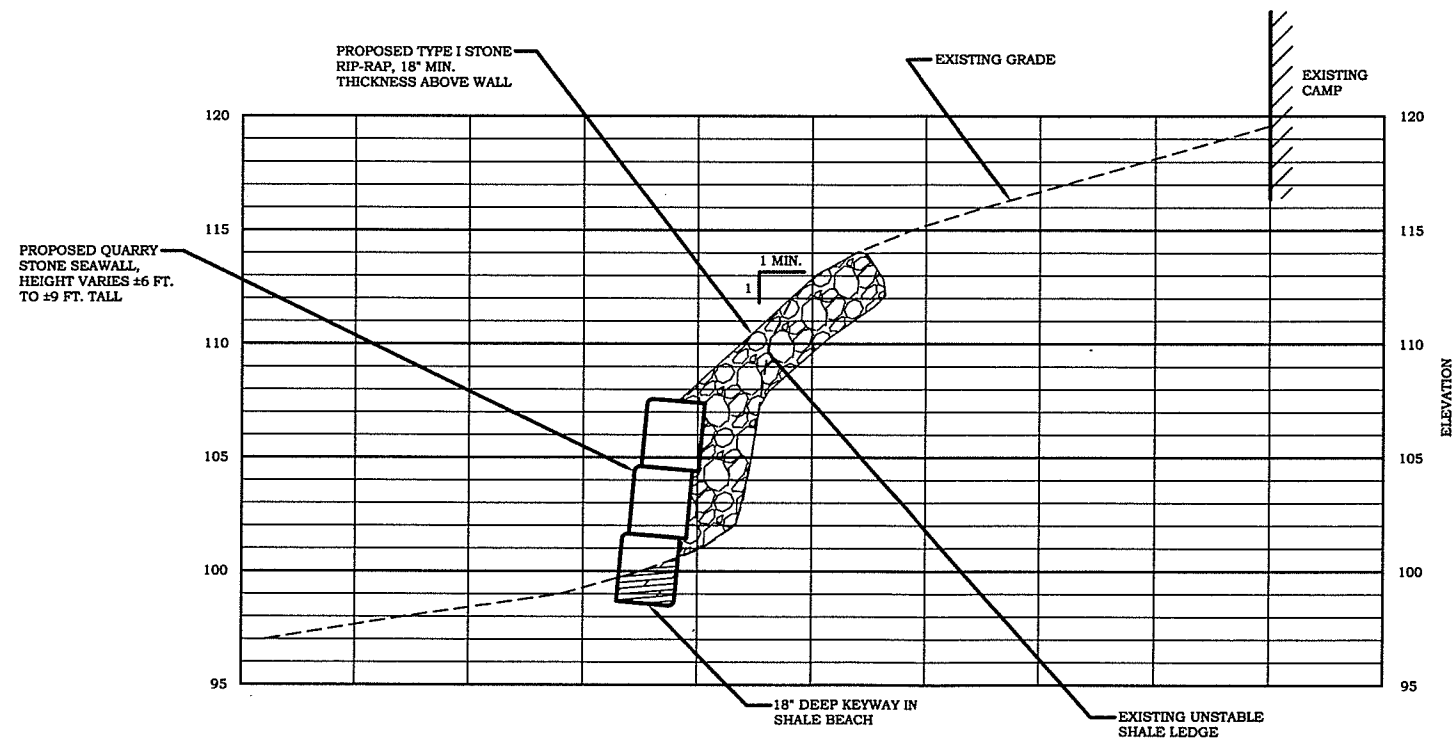
CJ Design Build
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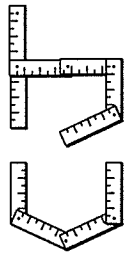
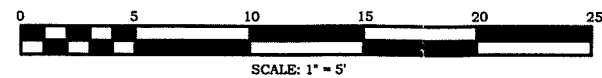
PARTIAL SITE PLAN
PORTEOUS SEAWALL
29 STARR FARM BEACH RD
BURLINGTON, VERMONT

DATE: 12/21/2016
SCALE: 1"=5'
DRAWN BY: CRC/JGE

REVISIONS



TYPICAL SECTION/PROFILE



Design Build

Construction and Remedial from Conception to Completion
215 CURTIS AVE
BURLINGTON, VT 05408
(802) 732-8461

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DEC 21 2016

DEPARTMENT OF
PLANNING & ZONING

SECTION/PROFILE
PORTEOUS SEAWALL
29 STARR FARM BEACH RD
BURLINGTON, VERMONT

DATE: 12/21/2016
SCALE: 1"=5'
DRAWN BY: CRC/JGE

REVISIONS

C-3



PHOTO #1

Existing Conditions at the proposed seawall location. Note portion of unstable shale ledge, undermined tree stumps and stair supports.

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DEC 21 2016

DEPARTMENT OF
PLANNING & ZONING



PHOTO #2

Existing seawall and slope stabilization at adjoining lot to the north. Proposed seawall and rip-rap will be similar in scale and color.

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DEC 21 2016

DEPARTMENT OF
PLANNING & ZONING



COLCHESTER AVENUE HOUSING STORMWATER NARRATIVE

TCE# 16-077 | 80 COLCHESTER AVE
BURLINGTON, VERMONT

Date:

January 16, 2017

Prepared For:

Eastern Development Corp.
80 Colchester Ave
Burlington, VT 05401

Prepared By:

Andrew G. Mills, P.E.
Jeremy M. Matosky, P.E.



Attachment 1: Narrative, Location Map, and Soils Map Colchester Avenue Housing

1) Introduction

Trudell Consulting Engineers (TCE) is writing on behalf of Eastern Development Corporation to apply for an Individual Stormwater Permit (INDS) for the above referenced project.

2) Project Description

The Colchester Avenue Housing project is a new residential project located at 80 Colchester Ave in Burlington. While the proposed building is new and primarily located on pervious surface, a portion of the project proposes to redevelop existing impervious. The project requires permit coverage due to the amount of new/redeveloped impervious. The project requires an Individual Permit as the Site Balancing technique will be used.

3) Existing Conditions

The Site is partially developed, with residential and commercial buildings along Colchester Ave and parking areas/drives to the north of the building. North of the developed area is a steeply sloped wooded ravine with a Class II wetland at the bottom of it. The site is generally sloped from south to north, with all surface runoff discharging to the wetland. The NRCS soils data indicates Adams and Windsor loamy sands on the southern portion of the site, transitioning to a Hartland very fine sandy loam, however it was reported to TCE and later confirmed by exploration that a significant portion of the site was filled. It is believed that the ravine used to extend south into the UVM campus and that the majority of the project is located on fill material.

4) Existing Stormwater System

There is no existing stormwater treatment system on the project site. Runoff discharges via overland flow to the receiving water. Runoff from offsite areas to the west also discharge to the ravine via an existing, excised channel. Additionally, there is an existing discharge pipe from the UVM campus also believed to discharge to the receiving water. All field efforts to locate this pipe outlet have not been successful.

5) Proposed Stormwater System

The Site has been designed to treat stormwater from new and existing impervious surfaces in accordance with the VSMM. The project proposes to utilize the Site Balancing procedure as the west section of the project area is difficult to provide treatment for. A small pocket pond has been included for the west section of the site to provide a modicum of treatment, but will not be in full conformance with the VSMM and therefore no credit has been taken for treatment of that areas. The project proposes to treat existing impervious surfaces on the south and east sides of the project area to balance the site. Treatment is proposed to be provided via an extended detention shallow wetland. Pretreatment is proposed to be provided by bio-retention areas located in the parking islands. The project will treat approximately 1.451 acres of new, redeveloped, and existing impervious.

i) Impervious Area

The proposed stormwater system captures and treats existing, redeveloped, and proposed impervious surfaces. None of the existing impervious on site is currently permitted. All existing on-site impervious surface is being removed or redeveloped for the construction of the new development. There are portions of existing off-site impervious draining to the POI, areas to the west up to Mansfield Avenue and to the east up to Fletcher Place. Due to various site constraints and the nature of the redevelopment, portions of existing impervious are proposed to be treated in lieu of treating all new and redeveloped impervious on the site, by following the Site Balancing procedure. The total existing impervious being treated is 0.316 acres. The total redeveloped impervious being treated is 0.444 acres. The total new impervious being treated is 0.700 acres. The total impervious being treated is 1.451 acres. The total redeveloped and new impervious not being treated is 0.232 acres.

ii) Receiving Body

The receiving water is an unnamed wetland tributary to the Winooski River.

iii) Cold/Warm Fish Habitat Designation

The receiving water is classified as a warm water fish habitat as all wetlands are considered so.

iv) Demonstration of Compliance

Compliance with the treatment standards are demonstrated at POI 001. Refer to the Watershed Map for this location.

(a) Water Quality Treatment Standard

S/N 001: The Water Quality treatment standard for the site is achieved through the ED shallow wetland. Pretreatment for the wetland is provided by the bioretention islands, which have been sized for greater than 10% of the entire treated site water quality volume, each. A deep pool has also been provided at the wetland inlet for further pretreatment. The following table summarizes the various wetland sizing requirements and the sizing provided.

Criteria	Required	Provided
Area (1% of DA)	910 SF	1,387 SF
Deep Zone (25% WQv)	576 CF	980 CF
Depth <6" (35% Area)	485 SF	877 SF
Depth <18" (65% Area)	902 SF	1,081 SF

(b) Groundwater Recharge Treatment Standard

We request that this criterion be waived for this project given the extensive fill soils.

(c) Channel Protection Standard

S/N 001: The Channel Protection Standard is met by the ED wetland, providing approximately 1,440 minutes of center-of-mass detention.

(d) Overbank Flood Protection Standard (Qp10)

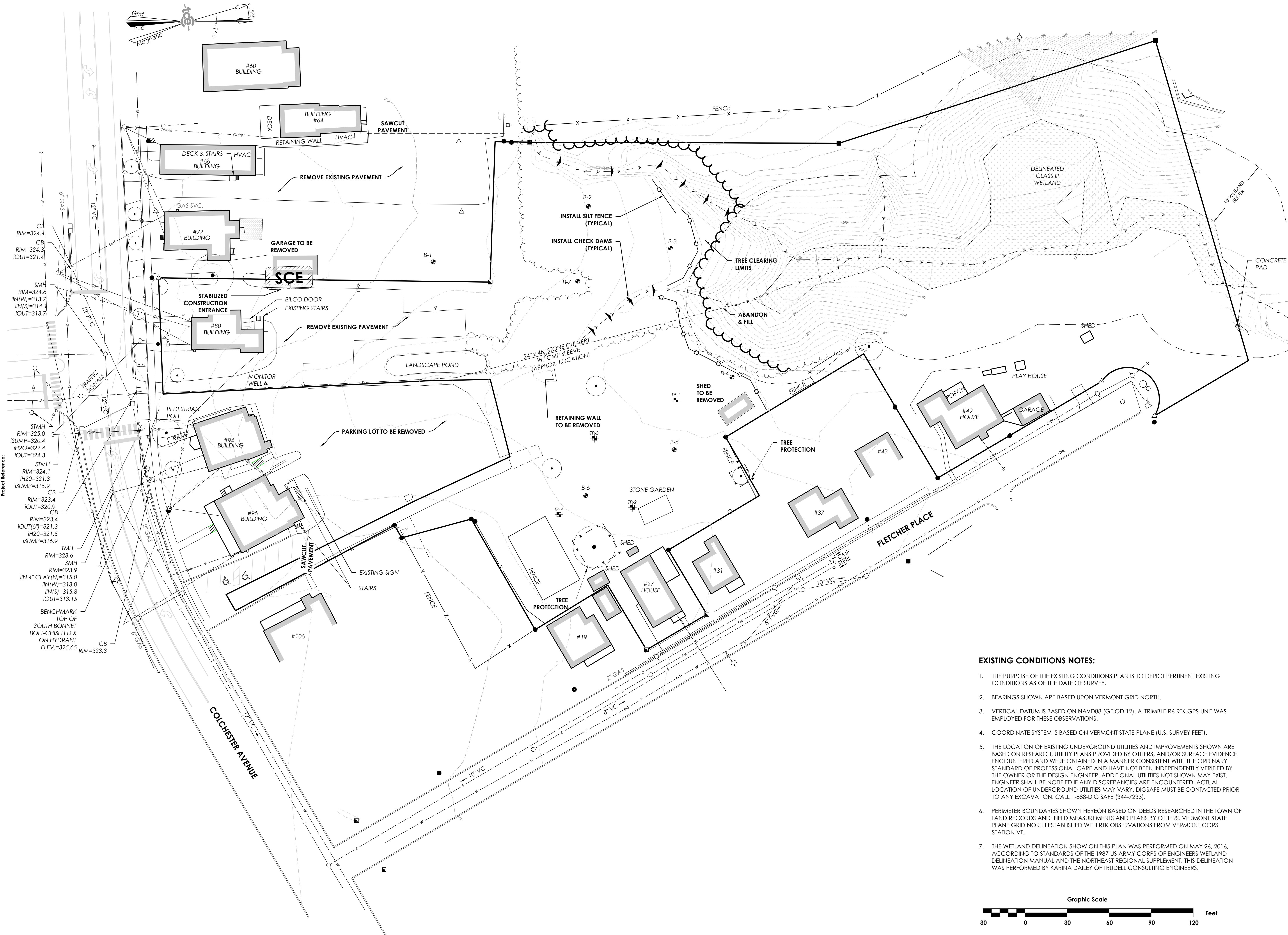
S/N 001: The Overbank Flood Protection Standard is met by the ED wetland, limiting post-development peak discharge rates to at or below pre-development conditions at the discharge point.

(e) Extreme Flood Protection Standard (Qp100)

The Extreme Flood Protection Standard is waived as the impervious area is less than 10 acres.

v) Offset Information

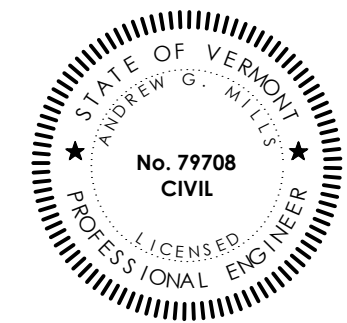
N/A



ENGINEERING • SURVEY
PLANNING • ENVIRONMENTAL
478 BLAIR PARK ROAD | WILLISTON, VERMONT 05495
802.879.6331 | WWW.TCEVT.COM

Revisions		No.	Description	Date	By
		1	City Comments	12/2/16	JMM
		2	DAB Comments	01/10/17	AGM
		3	Stormwater Update	01/17/17	AGM

TAX ID:
Use of These Drawings
1. Unless otherwise noted, these Drawings are intended for preliminary planning, coordination with other disciplines or utilities, and/or approval from the regulatory authorities. They are not intended as construction drawings unless noted as such or marked approved by a regulatory authority.
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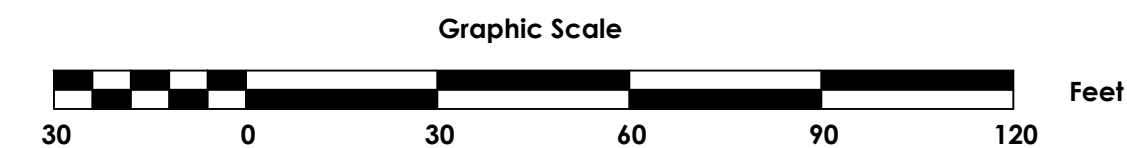


Project Title
Colchester Avenue Housing
Burlington, Vermont

Sheet Title
Existing Conditions & Demolition Plan

Date:	07/10/16
Scale:	1" = 30'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

C1-04





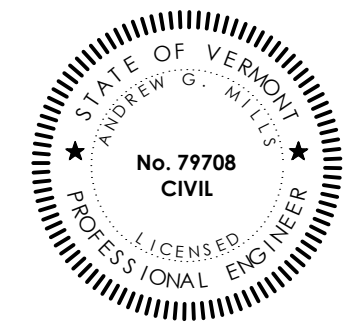
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Revisions	No.	Description	Date	By
	1	City Comments	12/2/16	JMM
	2	DAB Comments	01/10/17	AGM
	3	Stormwater Update	01/17/17	AGM

- TAX ID:**
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Project Title

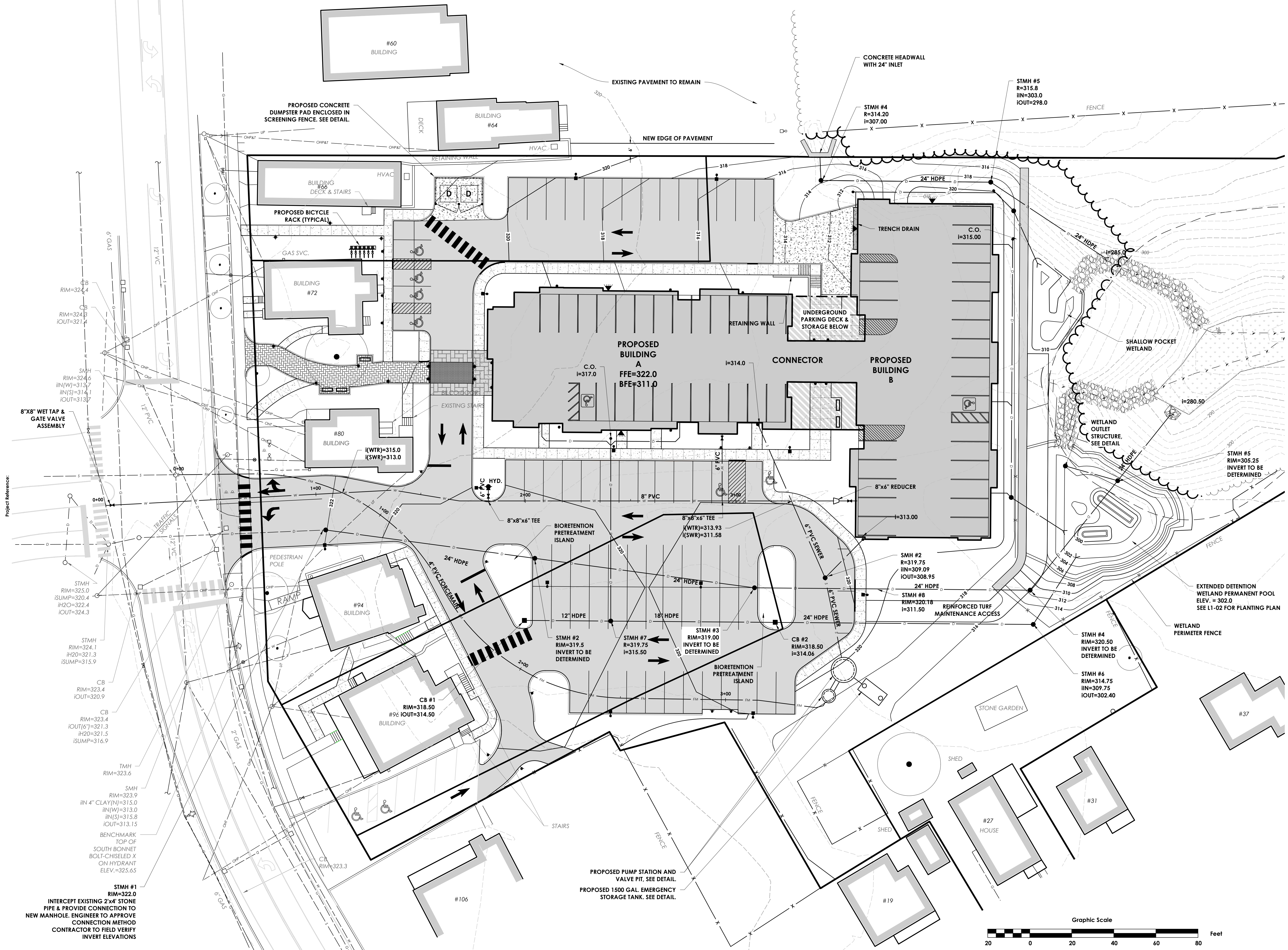
Colchester Avenue Housing Burlington, Vermont

Sheet Title

Utility Site Plan

Date:	07/10/16
Scale:	1" = 20'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

C2-02





No.	Description	Date	By
1	City Comments	12/2/16	JMM
2	DAB Comments	01/10/17	AGM
3	Stormwater Update	01/17/17	AGM

AX ID: _____

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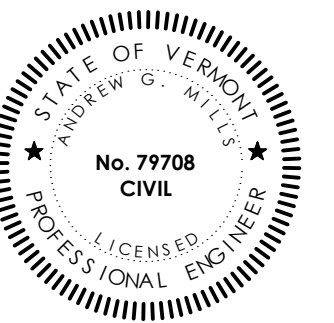
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Project Title

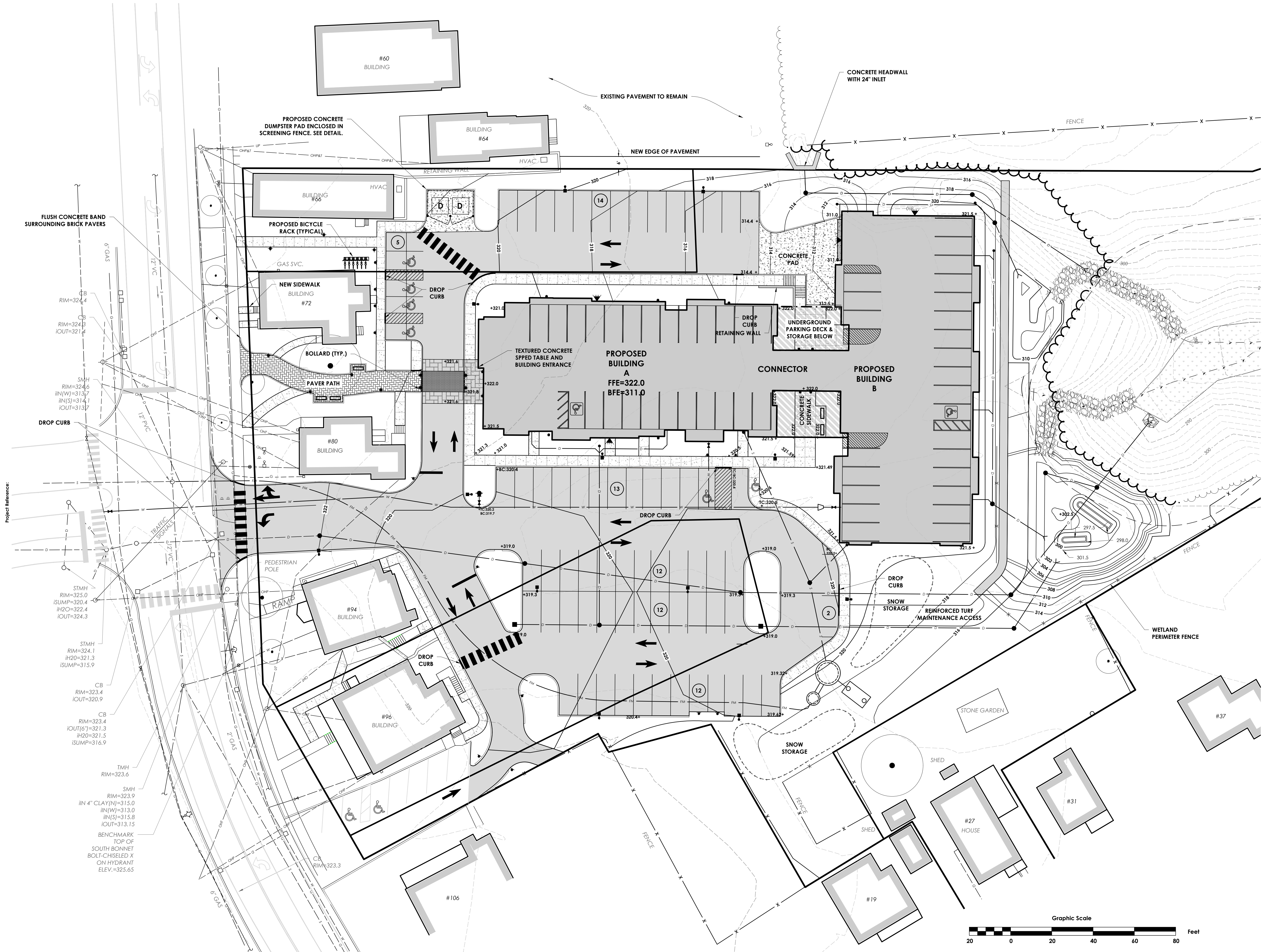
Colchester Avenue Housing Burlington, Vermont

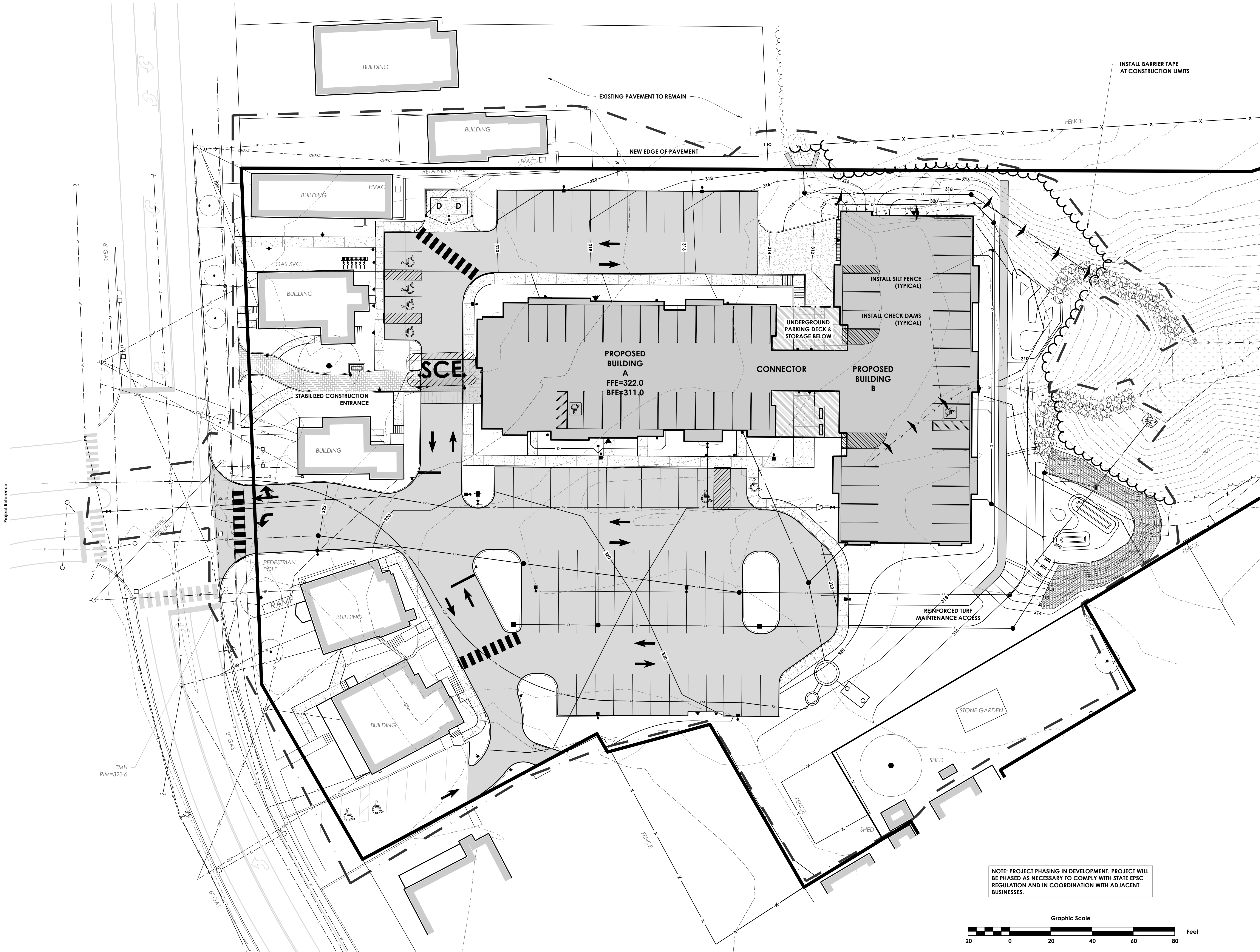
Sheet Title

Site Grading & Layout Plan

Date:	07/10/16
Scale:	1" = 20'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

C2-03





Project Reference:

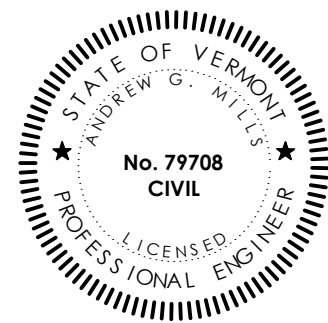


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Revisions		No.	Description	Date	By
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		2	Stormwater Update	1/17/17	AGM

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Project Title

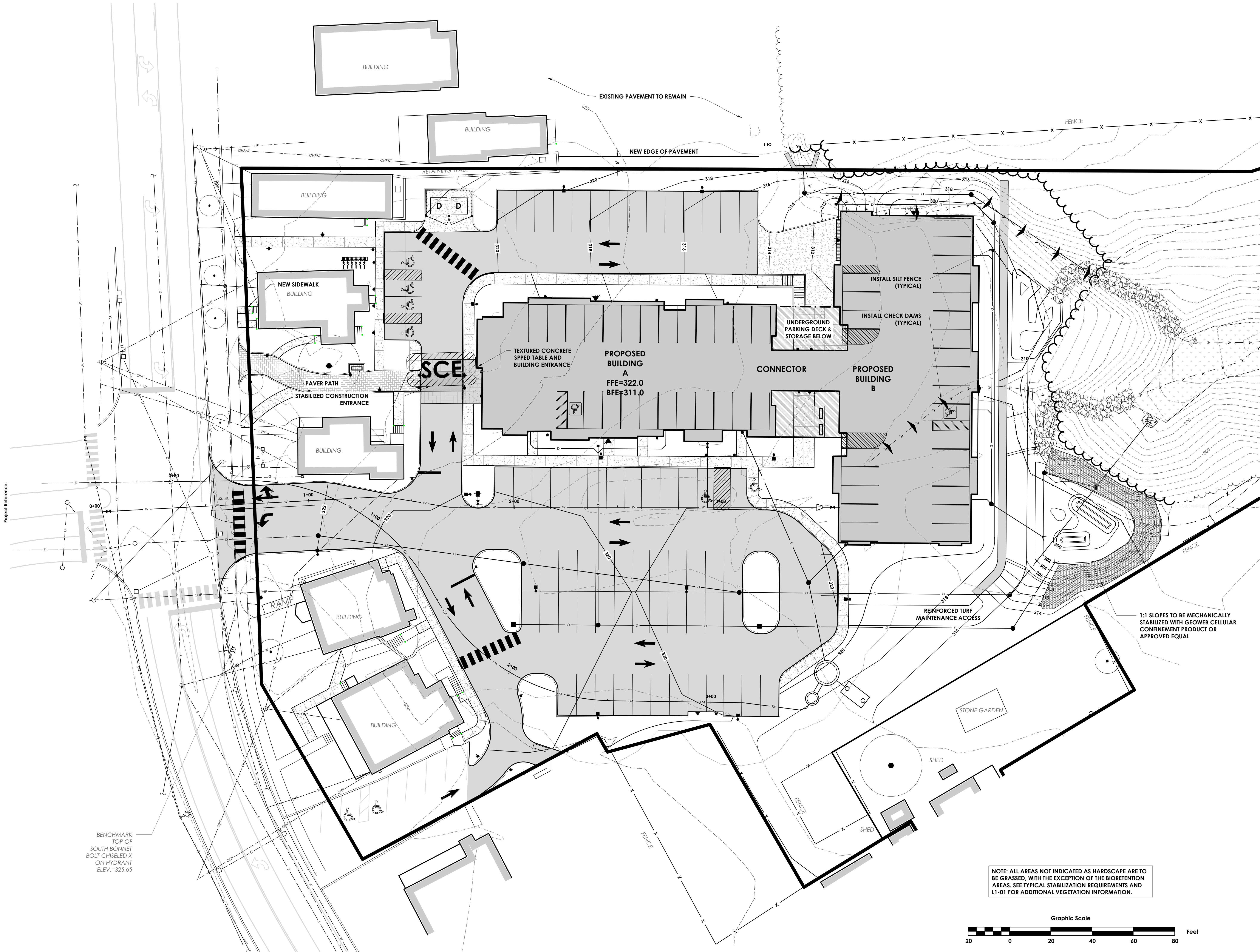
Colchester Avenue
Housing
Burlington, Vermont

Sheet Title

EPSC Construction Plan

Date:	07/10/16
Scale:	1" = 20'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

C5-01



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		2	Stormwater Update	1/17/17	AGM

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Project Title

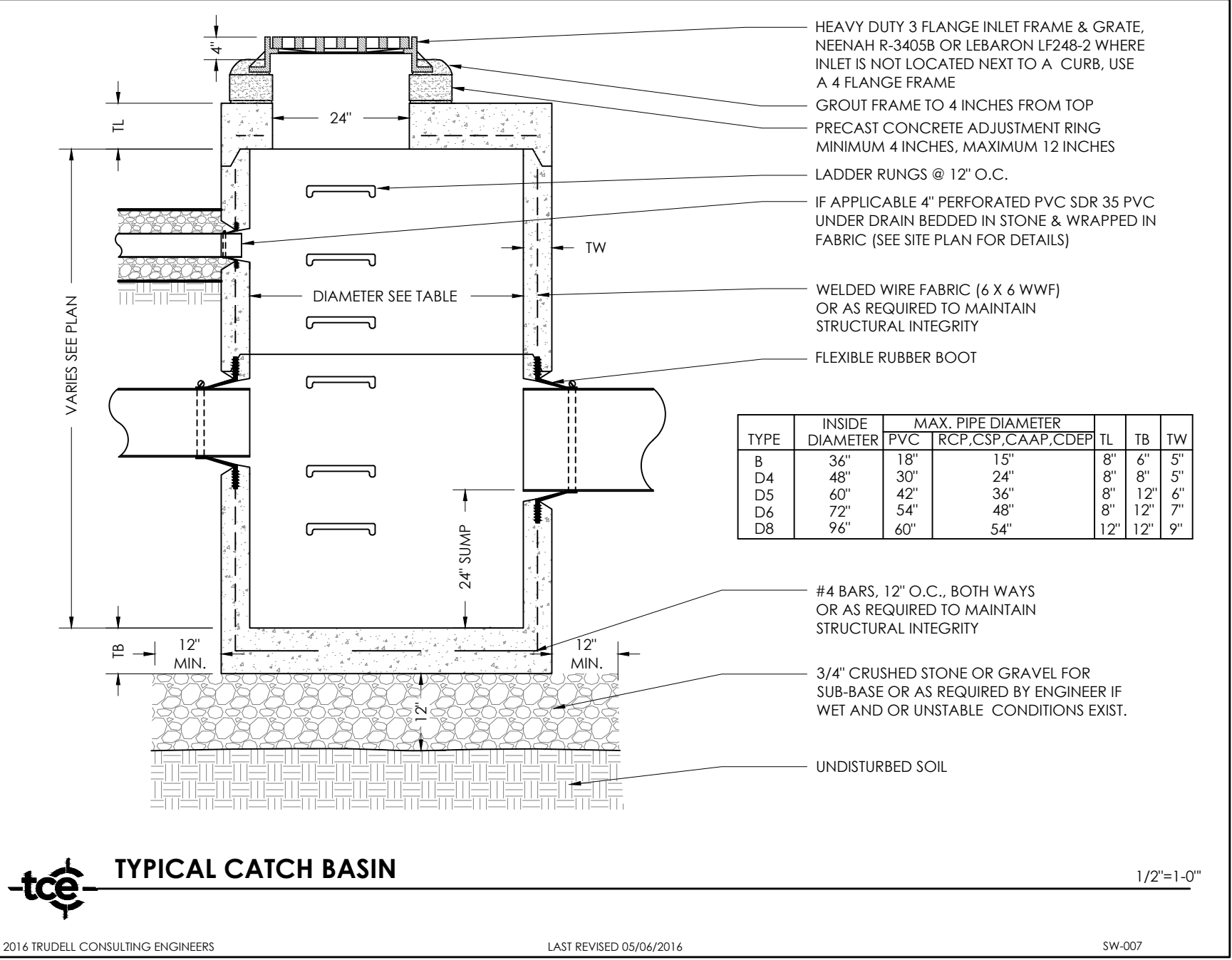
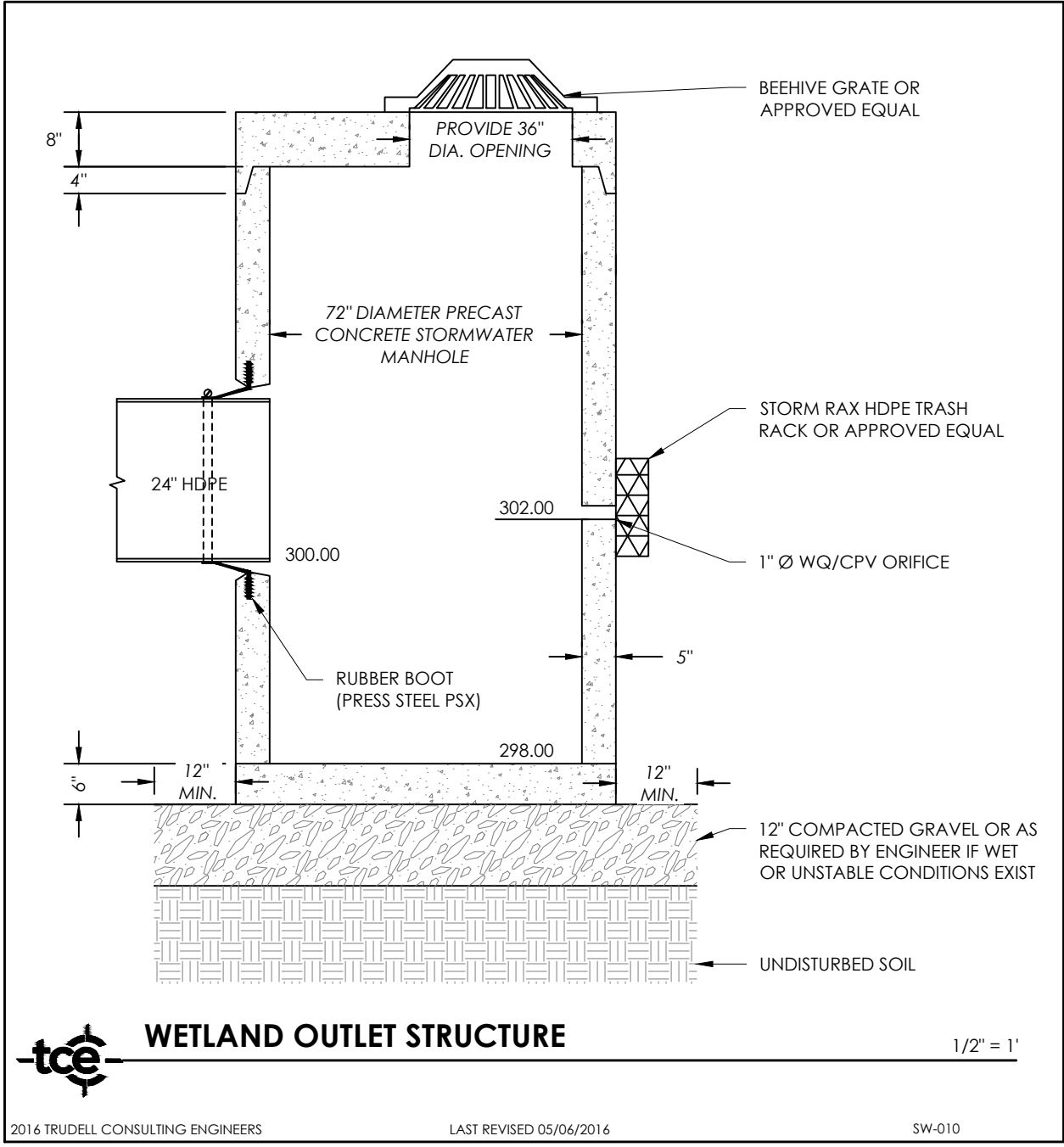
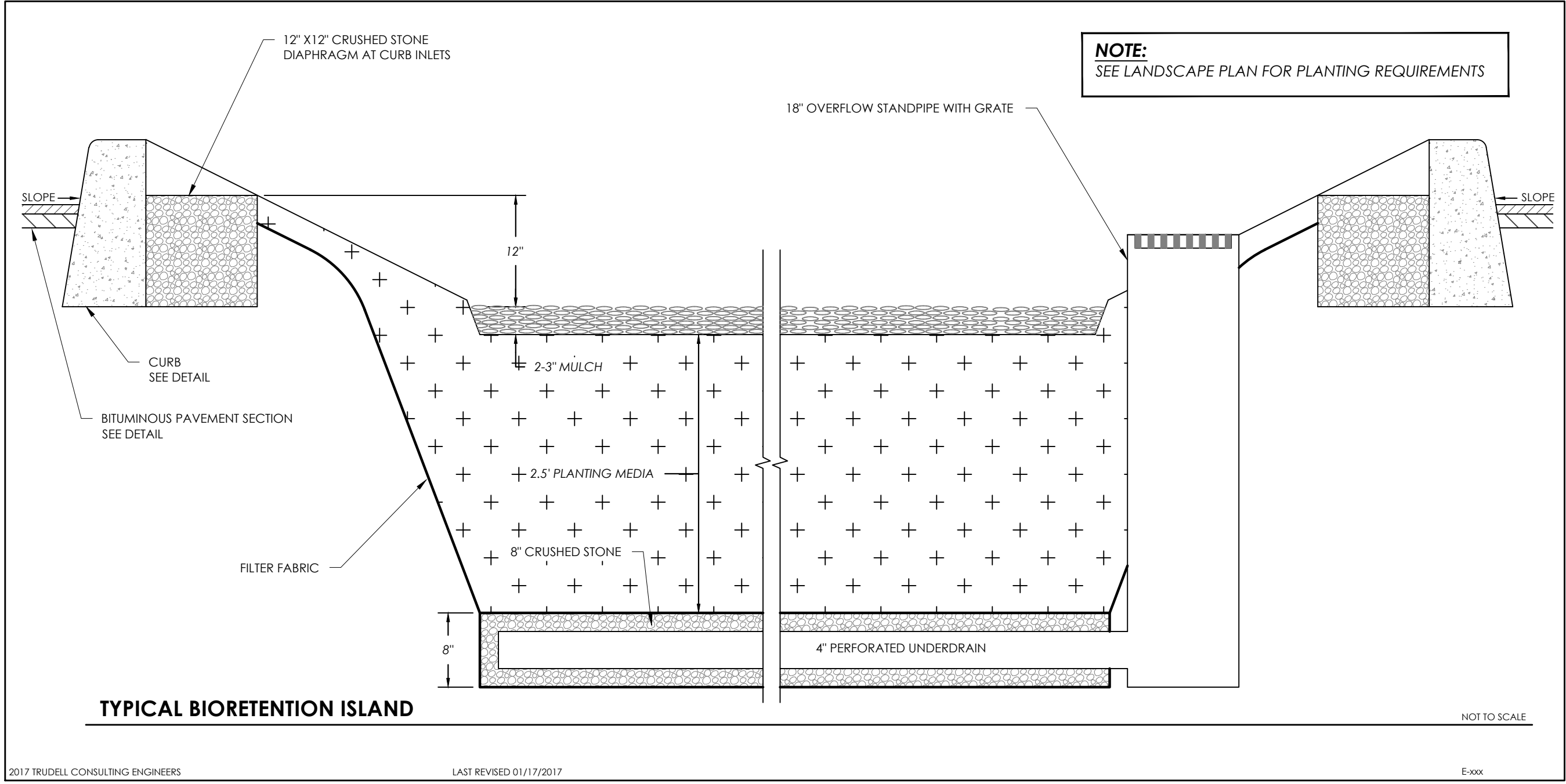
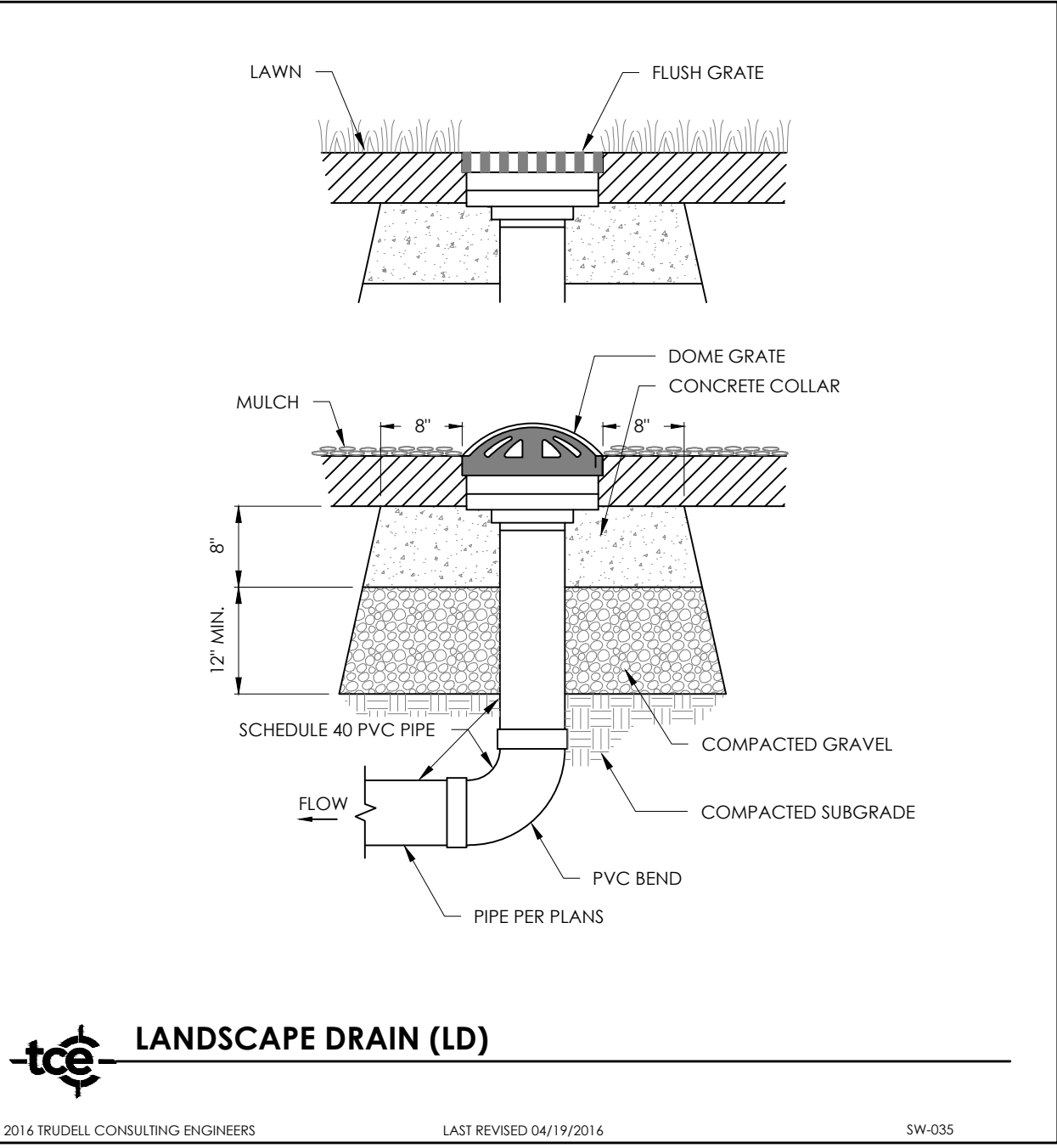
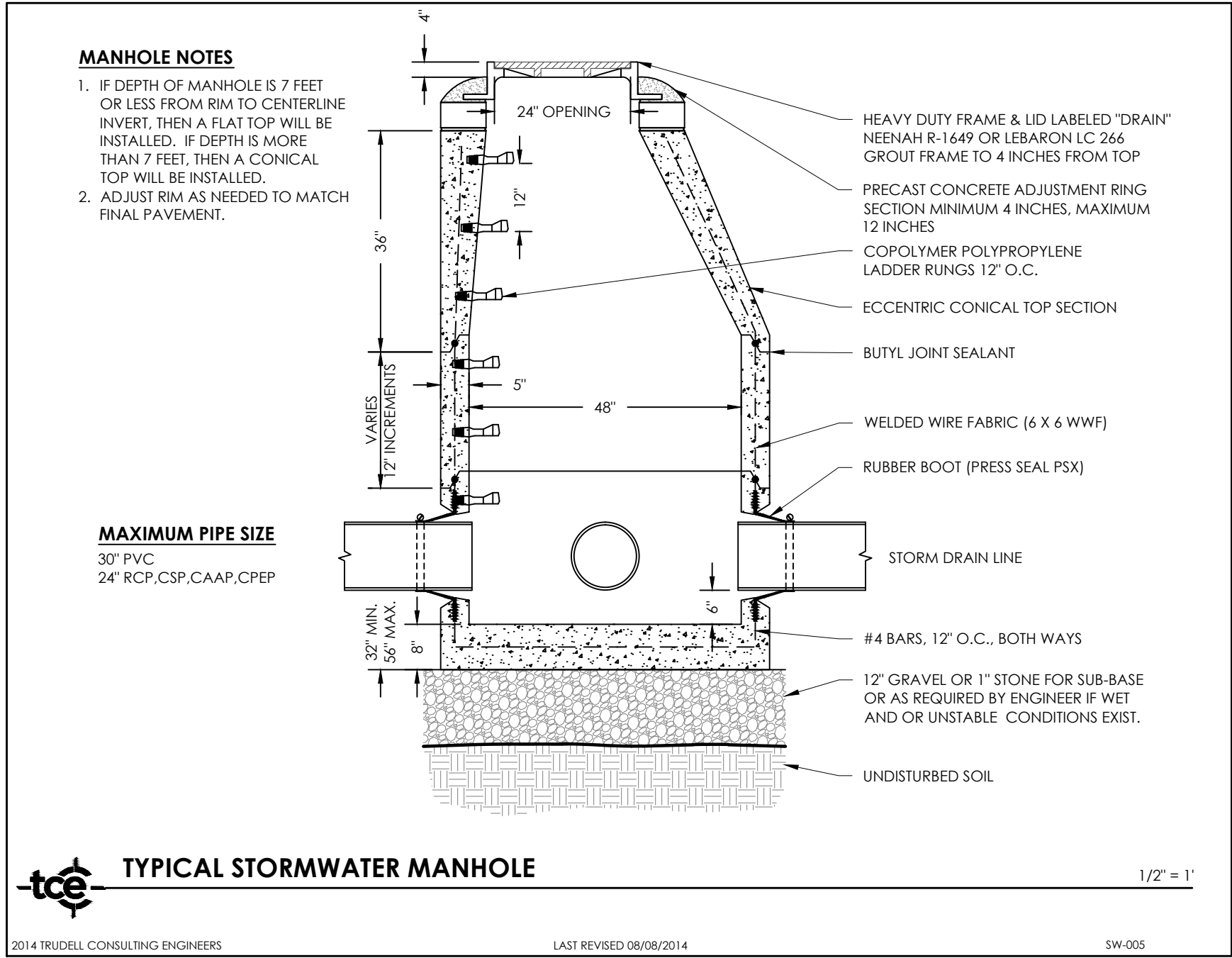
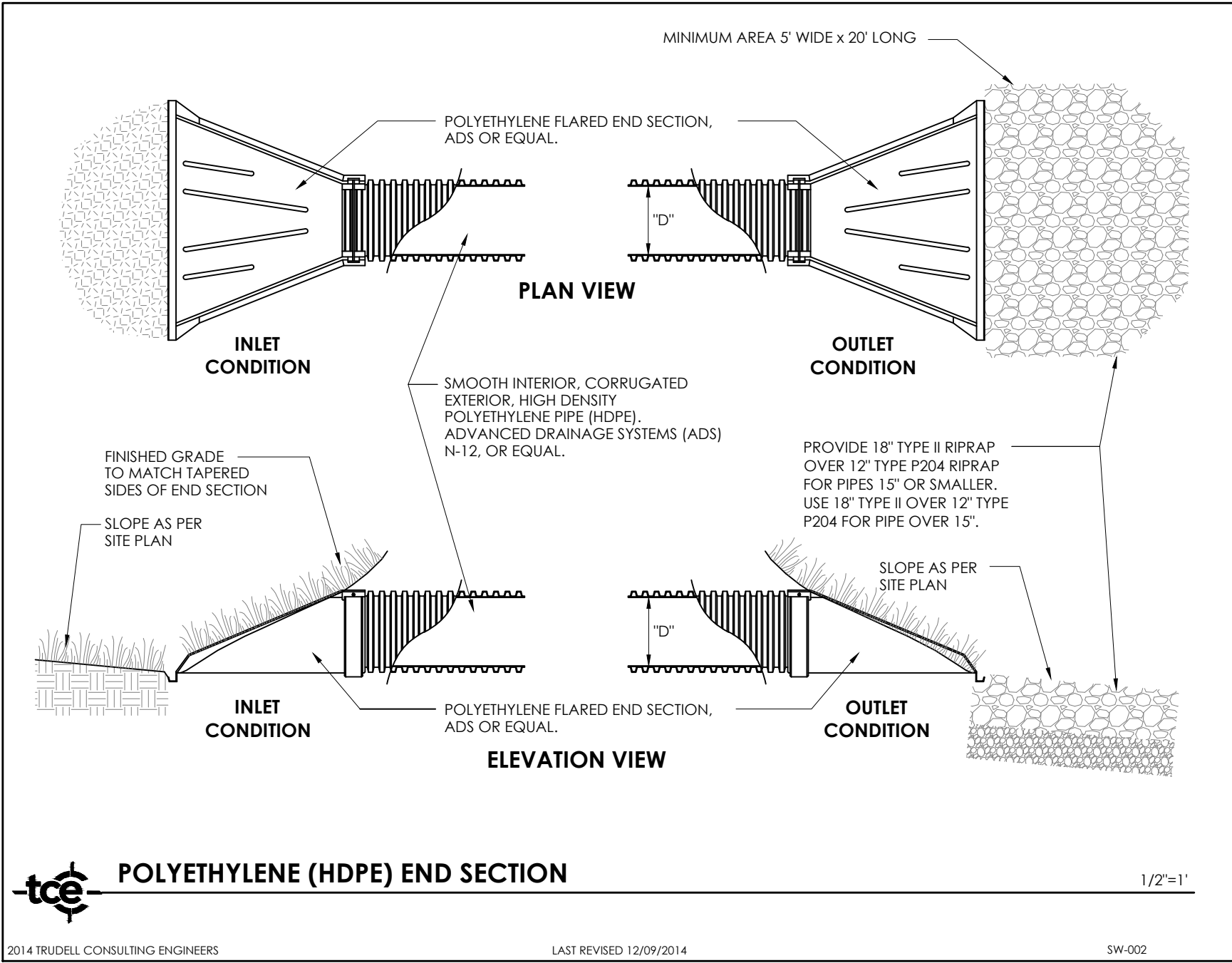
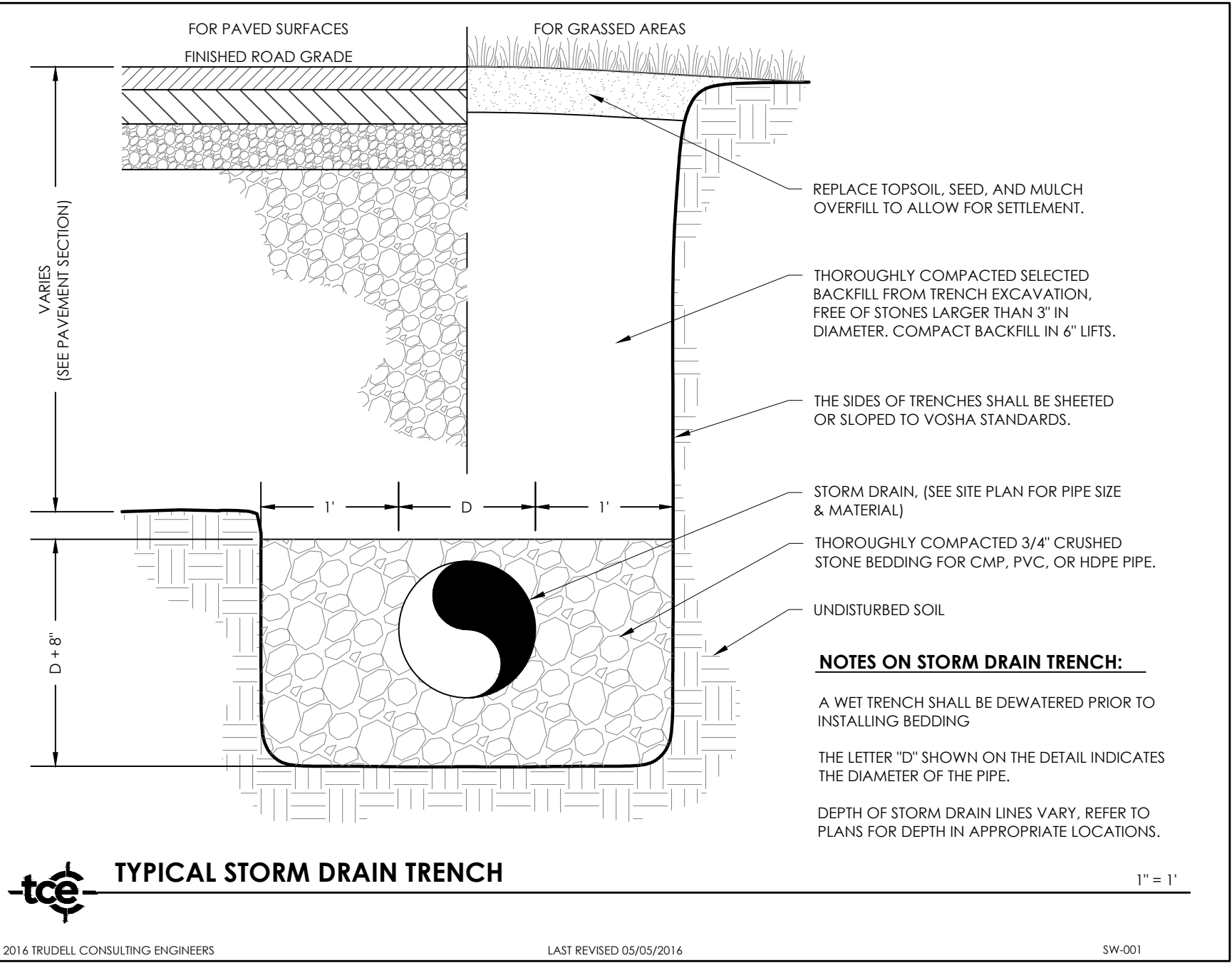
**Colchester Avenue
Housing**
Burlington, Vermont

Sheet Title

EPSC Stabilization Plan

Date:	07/10/16
Scale:	1" = 20'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

C5-02



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Project Title

Colchester Avenue Housing

Burlington, Vermont

Sheet Title

Stormwater Details

Date: 07/10/16

Scale: SHOWN

Project Number: 16-077

Drawn By: NPC

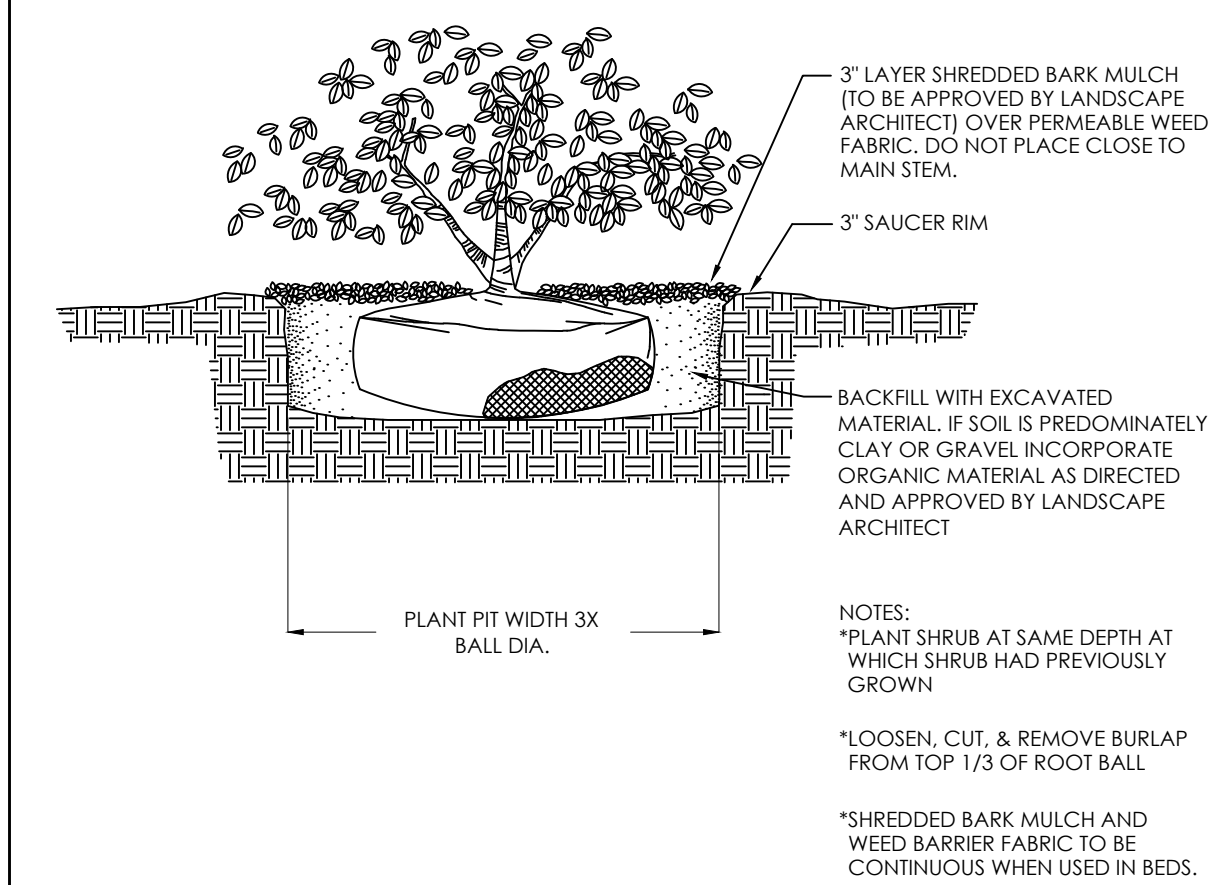
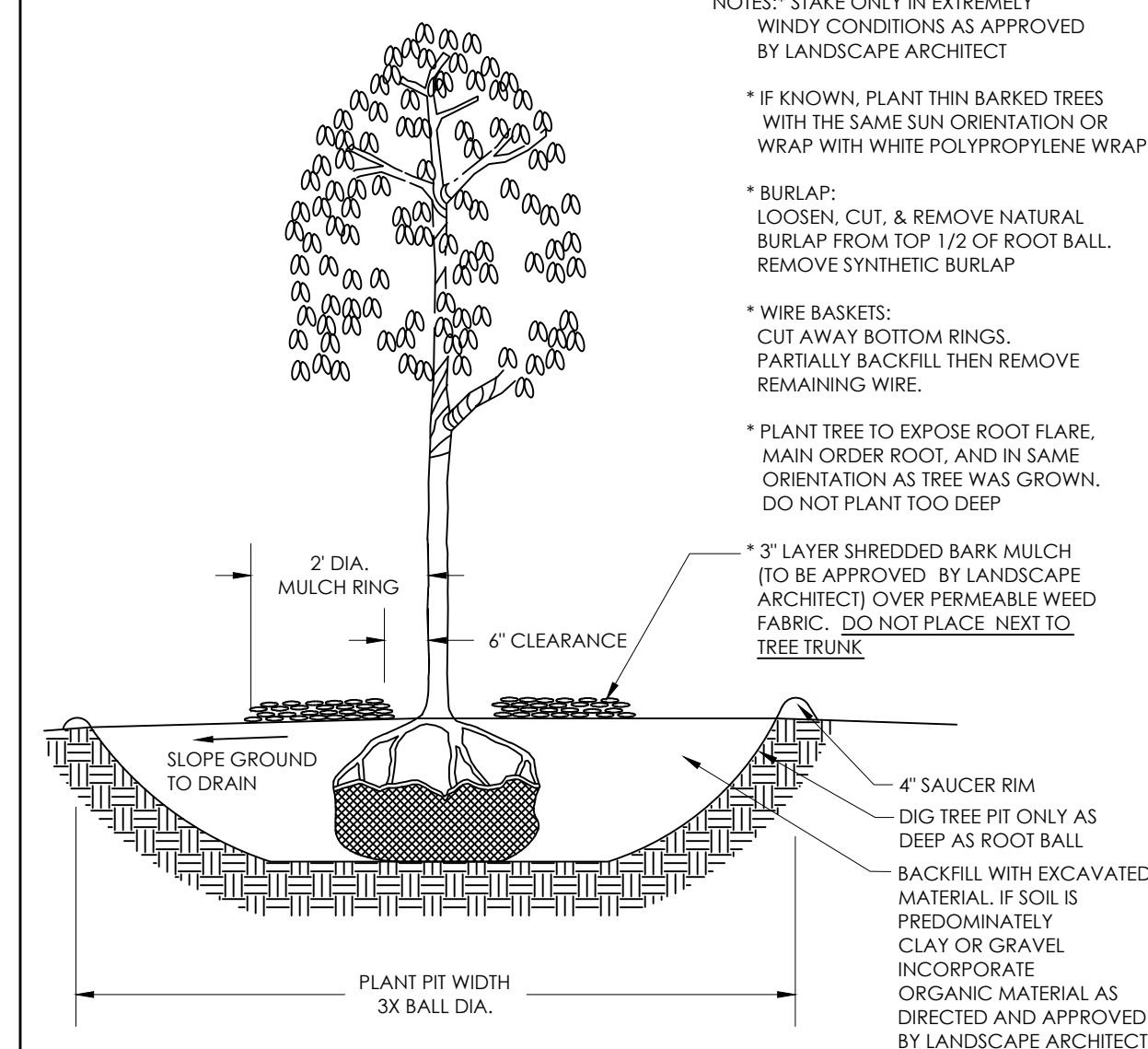
Project Engineer: AGM

Approved By: JMM

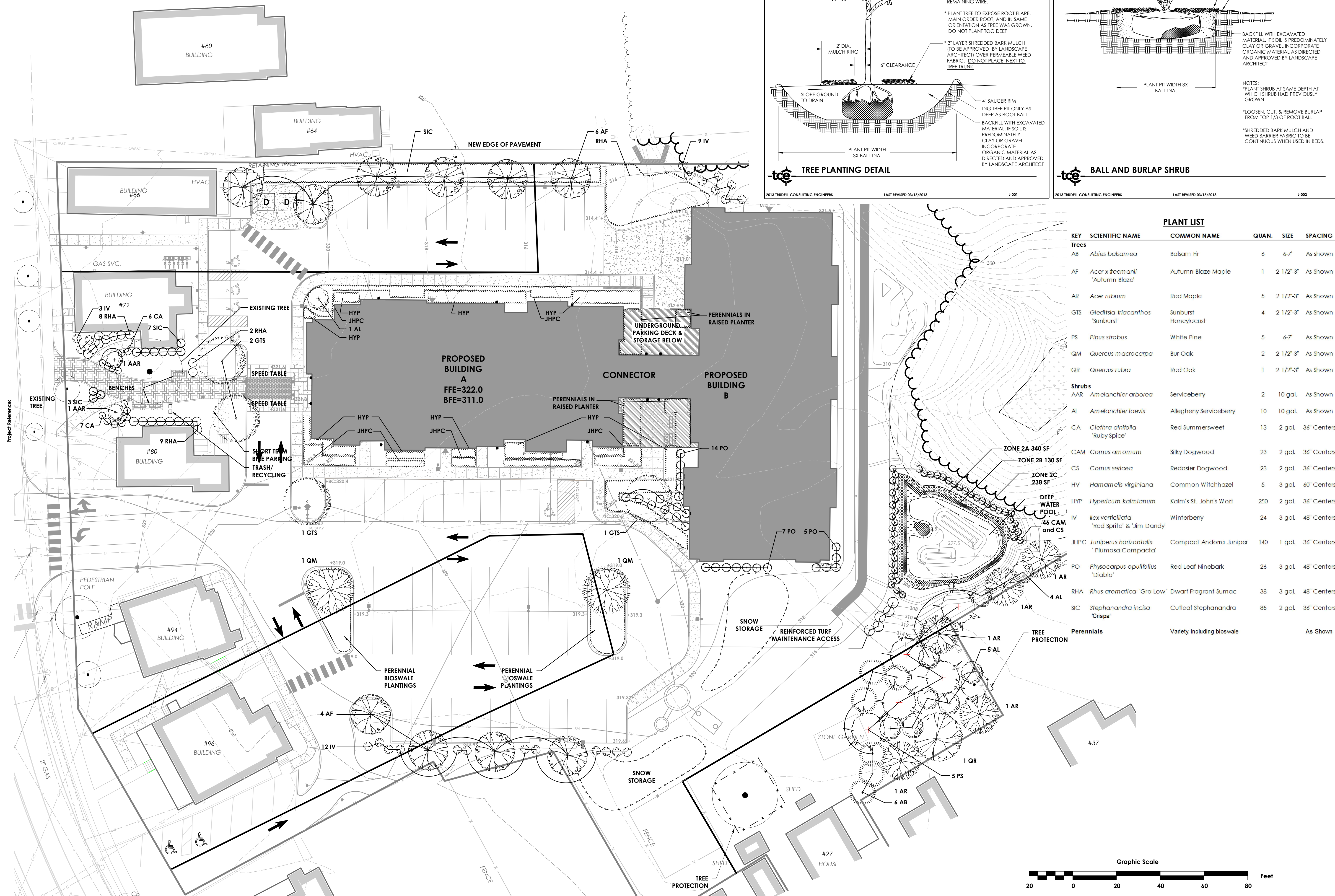
Field Book: 338



Revisions			
No.	Description	Date	By
1	DAB Comments	01/10/17	AGM
2	Stormwater Update	01/17/17	AGM

 **BALL AND BURLAP SHRUB**

 TREE PLANTING DETAIL



PLANT LIST						
KEY	SCIENTIFIC NAME	COMMON NAME	QUAN.	SIZE	SPACING	
Trees						
AB	<i>Abies balsamea</i>	Balsam Fir	6	6'-7"	As Shown	
AF	<i>Acer x freemanii</i> 'Autumn Blaze'	Autumn Blaze Maple	1	2 1/2'-3"	As Shown	
AR	<i>Acer rubrum</i>	Red Maple	5	2 1/2'-3"	As Shown	
GTS	<i>Gleditsia triacanthos</i> 'Sunburst'	Sunburst Honeylocust	4	2 1/2'-3"	As Shown	
PS	<i>Pinus strobus</i>	White Pine	5	6'-7"	As Shown	
QM	<i>Quercus macrocarpa</i>	Bur Oak	2	2 1/2'-3"	As Shown	
QR	<i>Quercus rubra</i>	Red Oak	1	2 1/2'-3"	As Shown	
Shrubs						
AAR	<i>Amelanchier arborea</i>	Serviceberry	2	10 gal.	As Shown	
AL	<i>Amelanchier laevis</i>	Allegheny Serviceberry	10	10 gal.	As Shown	
CA	<i>Clethra alnifolia</i> 'Ruby Spice'	Red Summersweet	13	2 gal.	36" Centers	
CAM	<i>Cornus amomum</i>	Silky Dogwood	23	2 gal.	36" Centers	
CS	<i>Cornus sericea</i>	Redosier Dogwood	23	2 gal.	36" Centers	
HV	<i>Hamamelis virginiana</i>	Common Witchhazel	5	3 gal.	60" Centers	
HYP	<i>Hypericum kalmianum</i>	Kalm's St. John's Wort	250	2 gal.	36" Centers	
IV	<i>Ilex verticillata</i> 'Red Sprite' & 'Jim Dandy'	Winterberry	24	3 gal.	48" Centers	
JHPC	<i>Juniperus horizontalis</i> 'Plumosa Compacta'	Compact Andorra Juniper	140	1 gal.	36" Centers	
PO	<i>Physocarpus opulifolius</i> 'Diablo'	Red Leaf Ninebark	26	3 gal.	48" Centers	
RHA	<i>Rhus aromatica</i> 'Gro-Low'	Dwarf Fragrant Sumac	38	3 gal.	48" Centers	
SIC	<i>Stephanandra incisa</i> 'Crispa'	Cutleaf Stephanandra	85	2 gal.	36" Centers	
Perennials		Variety including biosvale				As Shown

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Project Title

Colchester Avenue Housing

Burlington, Vermont

Sheet Title

Landscaping Plan

Date:	07/10/16
Scale:	1" = 20'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

L1-01



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Revisions			
No.	Description	Date	By

PLANT LIST											
KEY	SCIENTIFIC NAME	COMMON NAME	QUAN.	SIZE	SPACING	KEY	SCIENTIFIC NAME	COMMON NAME	QUAN.	SIZE	SPACING
Trees											
Shrubs											
AB	Abies balsamea	Balsam Fir	6	6-7"	As Shown	AAR	Amelanchier arborea	Serviceberry	2	10 gal.	As Shown
AF	Acer x freemanii 'Autumn Blaze'	Autumn Blaze Maple	1	2 1/2'-3"	As Shown	AL	Amelanchier laevis	Allegheny Serviceberry	10	10 gal.	As Shown
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QR	Quercus rubra	Red Oak	1	2 1/2'-3"	As Shown	HYP	Hypericum kalmianum	Kalm's St. John's Wort	250	2 gal.	36" Centers
						IV	Ilex verticillata 'Red Sprite' & 'Jim Dandy'	Winterberry	24	3 gal.	48" Centers
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						PO	Physocarpus opulifolius 'Diablo'	Red Leaf Ninebark	26	3 gal.	48" Centers
						RHA	Rhus aromatica 'Gro-Low'	Dwarf Fragrant Sumac	38	3 gal.	48" Centers
						SIC	Stephanandra incisa 'Crispa'	Cutleaf Stephanandra	85	2 gal.	36" Centers
						Perennials		Variety including bioswale			As Shown

STORMWATER PLANT NOTES:

ZONE 2A (UPLAND MOIST)
ZONE 2B (SATURATED SOIL)
ZONE 2C (SHALLOW WATER BENCH) - OUTER RIM OF PERMANENT POOL

ZONE 2A
NATIVE GRASS/WILDFLOWER SEED MIX PER ACRE AS FOLLOWS:

PREPARE SURFACE OF BASIN AS SHOWN ON THE PLANS UPWARD TO THE GREST WITH 3 INCHES OF TOPSOIL. DO NOT ADD FERTILIZER. SPREAD AND LIGHTLY RAKE THE FOLLOWING SEED MIX AT A RATE OF EIGHT POUNDS PER ACRE. PLANT WITH A TEMPORARY COVER CROP OF MIXED COMMON OAT AND ANNUAL RYE AT A RATE 28 POUNDS PER ACRE. MULCH WITH STERILE MULCH AND LIGHTLY ROLL. REMULCH AS NECESSARY OR USE PREFABRICATED MULCH BLANKET. SPRING OR EARLY FALL PLANTING IS RECOMMENDED.

SCIENTIFIC NAME	COMMON NAME
ASTER ERICOIDES	HEATH ASTER
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER
CAREX GRACILLIMA	GRACEFUL SEDGE
ELYMUS HYSTRIX	BOTTLEBRUSH GRASS
MONARDA FISTULOSA	BERGAMOT
PANICUM VIRGATUM	SWITCH GRASS
RUDBECKIA HIRTA	BLACK-EYED SUSAN
SOLIDAGO RIGIDA	STIFF GOLDENROD

ZONE 2B

HERBACEOUS PLUGS AS FOLLOWS:

PLANT PLUGS SHALL BE PLANTED IN TWO STAGGERED ROWS AROUND THE UPPER BAND OF THE ZONE ONCE THE PERMANENT POOLS ARE ESTABLISHED. PLANTS IN EACH ROW SHALL BE SPACED ONE FOOT APART HORIZONTALLY. ROWS SHALL BE SPACED 6 INCHES APART VERTICALLY.

THE HERBACEOUS PLUGS SHALL BE SELECTED FROM THE FOLLOWING MIX OF SPECIES. A MINIMUM OF THREE SPECIES SHALL BE USED WITH ANY INDIVIDUAL SPECIES NOT COVERING MORE THAN 50% OR LESS THAN 15% OF AREA TO BE PLANTED. PLANTS SHALL BE GROUPED IN CLUSTERS OF 5-12 OF THE SAME PLANT SPECIES, WITH GROUPS DISTRIBUTED UNIFORMLY THROUGHOUT THE PLANTING ZONE. THE VENDOR SHALL RECOMMEND AN APPROPRIATE SUBSTITUTION OF SPECIES BASED ON AVAILABILITY AND TIME OF PLANTING.

SCIENTIFIC NAME
ANEMONE CANADENSIS
ASTER NOVAE-ANGLIAE
CAREX COMOSA
CAREX VULPINODEA
IRIS VIRGINICA
JUNCUS EFFUSUS
LIATRIS SPICATA
SCIRPUS ATROVIRENS

COMMON NAME
MEADOW ANEMONE
NEW ENGLAND ASTER
BRISTLY SEDGE
BROWN FOX SEDGE
BLUE FLAG
COMMON RUSH
BLAZING STAR
DARK GREEN RUSH

ZONE 2C

HERBACEOUS PLUGS AS FOLLOWS:

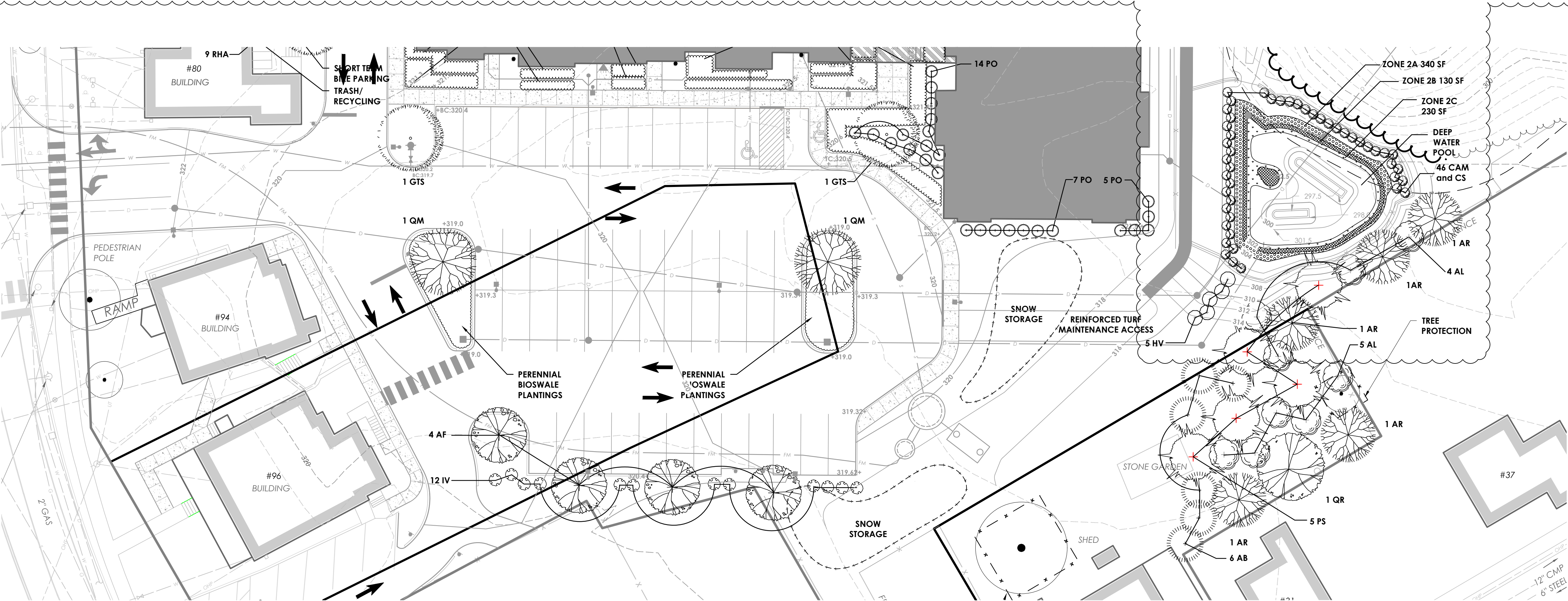
PLANT PLUGS SHALL BE PLANTED IN TWO STAGGERED ROWS AROUND THE UPPER BAND OF THE ZONE ONCE THE PERMANENT POOLS ARE ESTABLISHED. PLANTS IN EACH ROW SHALL BE SPACED ONE FOOT APART HORIZONTALLY. ROWS SHALL BE SPACED 6 INCHES APART VERTICALLY. A MINIMUM OF 2/3RDS OF EACH PLANT SHOOT SHOULD REMAIN ABOVE THE WATER LEVEL.

THE HERBACEOUS PLUGS SHALL BE SELECTED FROM THE FOLLOWING MIX OF SPECIES. A MINIMUM OF THREE SPECIES SHALL BE USED WITH ANY INDIVIDUAL SPECIES NOT COVERING MORE THAN 50% OR LESS THAN 15% OF AREA TO BE PLANTED. PLANTS SHALL BE GROUPED IN CLUSTERS OF 5-12 OF THE SAME PLANT SPECIES, WITH GROUPS DISTRIBUTED UNIFORMLY THROUGHOUT THE PLANTING ZONE. THE VENDOR SHALL RECOMMEND AN APPROPRIATE SUBSTITUTION OF SPECIES BASED ON AVAILABILITY AND TIME OF PLANTING.

SCIENTIFIC NAME
SAGITTARIA LATIFOLIA
SCIRPUS VALIDUS
PONTEDERIA CORDATA
POTAMOGETON NODOSUS
CAREX LACUSTRIS
ACORUS CALAMUS

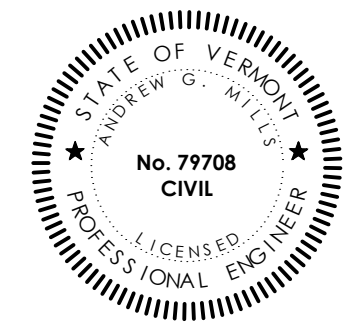
COMMON NAME
BROADLEAF ARROWHEAD
SOFTSTEM BULRUSH
PICKERELWEED
LONGLEAF PONDWEED
COMMON LAKE SEDGE
SWEET FLAG

Project Reference:



TAX ID:

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Project Title

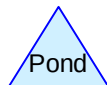
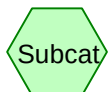
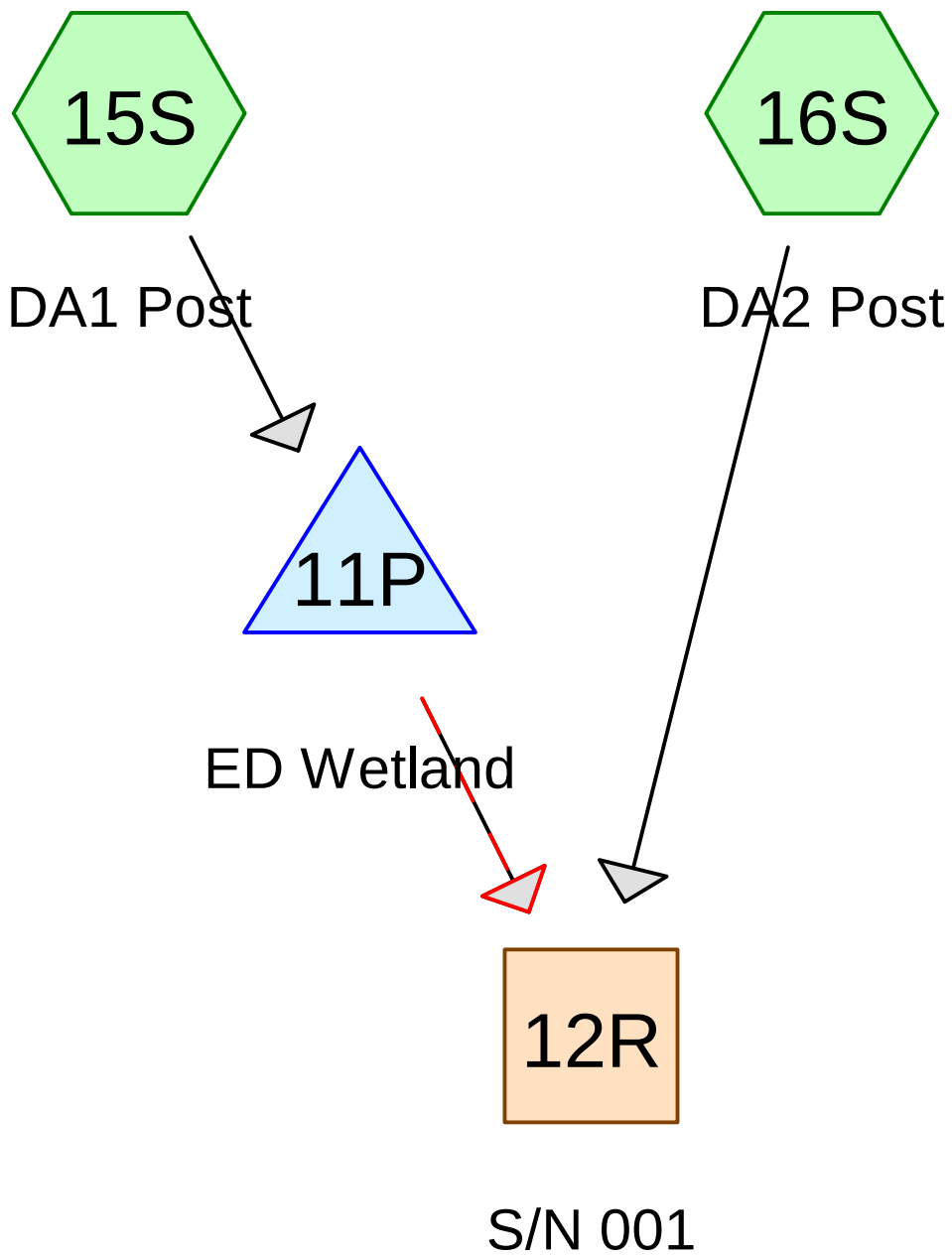
Colchester Avenue
Housing
Burlington, Vermont

Sheet Title

Stormwater
Landscaping Plan

Date:	01/17/17
Scale:	1" = 20'
Project Number:	16-077
Drawn By:	NPC
Project Engineer:	AGM
Approved By:	JMM
Field Book:	338

L1-02



Summary for Subcatchment 15S: DA1 Post

Runoff = 3.48 cfs @ 12.03 hrs, Volume= 0.228 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.10"

Area (ac)	CN	Description
* 1.316	98	Impervious, HSG A
* 0.109	98	Impervious, HSG B
0.026	98	Paved parking, HSG C
0.113	30	Woods, Good, HSG A
0.496	39	>75% Grass cover, Good, HSG A
0.030	74	>75% Grass cover, Good, HSG C
2.090	80	Weighted Average
0.639		30.57% Pervious Area
1.451		69.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 2.30"
0.4	75	0.0300	3.52		Shallow Concentrated Flow, Pavement
					Paved Kv= 20.3 fps
12.0	175	Total			

Summary for Subcatchment 16S: DA2 Post

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 4.05 cfs @ 11.89 hrs, Volume= 0.194 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.10"

Area (ac)	CN	Description
* 1.165	98	Impervious, HSG A
* 0.059	98	Impervious, HSG C
0.465	30	Woods, Good, HSG A
0.230	55	Woods, Good, HSG B
0.977	39	>75% Grass cover, Good, HSG A
0.185	61	>75% Grass cover, Good, HSG B
0.021	74	>75% Grass cover, Good, HSG C
3.102	64	Weighted Average
1.878		60.54% Pervious Area
1.224		39.46% Impervious Area

Summary for Reach 12R: S/N 001

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.192 ac, 51.52% Impervious, Inflow Depth > 0.94" for 1-year event
 Inflow = 4.08 cfs @ 11.89 hrs, Volume= 0.407 af
 Outflow = 4.08 cfs @ 11.89 hrs, Volume= 0.407 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 11P: ED Wetland

Inflow Area = 2.090 ac, 69.43% Impervious, Inflow Depth = 1.31" for 1-year event
 Inflow = 3.48 cfs @ 12.03 hrs, Volume= 0.228 af
 Outflow = 0.22 cfs @ 13.01 hrs, Volume= 0.214 af, Atten= 94%, Lag= 58.8 min
 Primary = 0.22 cfs @ 13.01 hrs, Volume= 0.214 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Starting Elev= 302.00' Surf.Area= 1,387 sf Storage= 1,455 cf

Peak Elev= 305.52' @ 13.01 hrs Surf.Area= 2,379 sf Storage= 8,044 cf (6,589 cf above start)

Plug-Flow detention time= 1,556.9 min calculated for 0.180 af (79% of inflow)

Center-of-Mass det. time= 1,240.1 min (2,008.7 - 768.6)

Volume	Invert	Avail.Storage	Storage Description
#1	297.50'	12,130 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.50	59	0	0
298.00	94	38	38
300.00	266	360	398
301.50	510	582	980
302.00	1,387	474	1,455
304.00	1,929	3,316	4,771
306.00	2,521	4,450	9,221
307.00	3,297	2,909	12,130

Device	Routing	Invert	Outlet Devices
#1	Primary	293.00'	24.0" Round Culvert L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 293.00' / 288.00' S= 0.0909 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	302.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	305.50'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	306.00'	4.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

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Type II 24-hr 1-year Rainfall=2.10"

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Primary OutFlow Max=0.13 cfs @ 13.01 hrs HW=305.52' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.13 cfs of 51.34 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 8.98 fps)
- ↑ **3=Orifice/Grate** (Weir Controls 0.09 cfs @ 0.46 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.00' (Free Discharge)

- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 15S: DA1 Post

Runoff = 5.41 cfs @ 12.03 hrs, Volume= 0.361 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=3.20"

Area (ac)	CN	Description
* 1.316	98	Impervious, HSG A
* 0.109	98	Impervious, HSG B
0.026	98	Paved parking, HSG C
0.113	30	Woods, Good, HSG A
0.496	39	>75% Grass cover, Good, HSG A
0.030	74	>75% Grass cover, Good, HSG C
2.090	80	Weighted Average
0.639		30.57% Pervious Area
1.451		69.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 2.30"
0.4	75	0.0300	3.52		Shallow Concentrated Flow, Pavement
					Paved Kv= 20.3 fps
12.0	175	Total			

Summary for Subcatchment 16S: DA2 Post

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 6.44 cfs @ 11.89 hrs, Volume= 0.316 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=3.20"

Area (ac)	CN	Description
* 1.165	98	Impervious, HSG A
* 0.059	98	Impervious, HSG C
0.465	30	Woods, Good, HSG A
0.230	55	Woods, Good, HSG B
0.977	39	>75% Grass cover, Good, HSG A
0.185	61	>75% Grass cover, Good, HSG B
0.021	74	>75% Grass cover, Good, HSG C
3.102	64	Weighted Average
1.878		60.54% Pervious Area
1.224		39.46% Impervious Area

Summary for Reach 12R: S/N 001

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.192 ac, 51.52% Impervious, Inflow Depth > 1.53" for 10-year event
 Inflow = 6.48 cfs @ 11.89 hrs, Volume= 0.662 af
 Outflow = 6.48 cfs @ 11.89 hrs, Volume= 0.662 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 11P: ED Wetland

Inflow Area = 2.090 ac, 69.43% Impervious, Inflow Depth = 2.08" for 10-year event
 Inflow = 5.41 cfs @ 12.03 hrs, Volume= 0.361 af
 Outflow = 4.63 cfs @ 12.11 hrs, Volume= 0.346 af, Atten= 14%, Lag= 5.0 min
 Primary = 4.63 cfs @ 12.11 hrs, Volume= 0.346 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Starting Elev= 302.00' Surf.Area= 1,387 sf Storage= 1,455 cf

Peak Elev= 305.78' @ 12.12 hrs Surf.Area= 2,456 sf Storage= 8,676 cf (7,222 cf above start)

Plug-Flow detention time= 960.3 min calculated for 0.313 af (87% of inflow)

Center-of-Mass det. time= 798.1 min (1,557.0 - 758.8)

Volume	Invert	Avail.Storage	Storage Description
#1	297.50'	12,130 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.50	59	0	0
298.00	94	38	38
300.00	266	360	398
301.50	510	582	980
302.00	1,387	474	1,455
304.00	1,929	3,316	4,771
306.00	2,521	4,450	9,221
307.00	3,297	2,909	12,130

Device	Routing	Invert	Outlet Devices
#1	Primary	293.00'	24.0" Round Culvert L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 293.00' / 288.00' S= 0.0909 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	302.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	305.50'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	306.00'	4.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

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Type II 24-hr 10-year Rainfall=3.20"

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Primary OutFlow Max=4.27 cfs @ 12.11 hrs HW=305.77' (Free Discharge)

- ↑ **1=Culvert** (Passes 4.27 cfs of 51.89 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 9.29 fps)
- ↑ **3=Orifice/Grate** (Weir Controls 4.22 cfs @ 1.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.00' (Free Discharge)

- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 15S: DA1 Post

Runoff = 1.36 cfs @ 12.03 hrs, Volume= 0.084 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.90"

Area (ac)	CN	Description
* 1.316	98	Impervious, HSG A
* 0.109	98	Impervious, HSG B
0.026	98	Paved parking, HSG C
0.113	30	Woods, Good, HSG A
0.496	39	>75% Grass cover, Good, HSG A
0.030	74	>75% Grass cover, Good, HSG C
2.090	80	Weighted Average
0.639		30.57% Pervious Area
1.451		69.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 2.30"
0.4	75	0.0300	3.52		Shallow Concentrated Flow, Pavement
					Paved Kv= 20.3 fps
12.0	175	Total			

Summary for Subcatchment 16S: DA2 Post

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.60 cfs @ 11.89 hrs, Volume= 0.071 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.90"

Area (ac)	CN	Description
* 1.165	98	Impervious, HSG A
* 0.059	98	Impervious, HSG C
0.465	30	Woods, Good, HSG A
0.230	55	Woods, Good, HSG B
0.977	39	>75% Grass cover, Good, HSG A
0.185	61	>75% Grass cover, Good, HSG B
0.021	74	>75% Grass cover, Good, HSG C
3.102	64	Weighted Average
1.878		60.54% Pervious Area
1.224		39.46% Impervious Area

Summary for Reach 12R: S/N 001

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.192 ac, 51.52% Impervious, Inflow Depth > 0.36" for WQv event
 Inflow = 1.62 cfs @ 11.89 hrs, Volume= 0.155 af
 Outflow = 1.62 cfs @ 11.89 hrs, Volume= 0.155 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 11P: ED Wetland

Inflow Area = 2.090 ac, 69.43% Impervious, Inflow Depth = 0.48" for WQv event
 Inflow = 1.36 cfs @ 12.03 hrs, Volume= 0.084 af
 Outflow = 0.03 cfs @ 15.78 hrs, Volume= 0.084 af, Atten= 98%, Lag= 224.9 min
 Primary = 0.03 cfs @ 15.78 hrs, Volume= 0.084 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Starting Elev= 302.00' Surf.Area= 1,387 sf Storage= 1,455 cf

Peak Elev= 303.57' @ 15.78 hrs Surf.Area= 1,812 sf Storage= 3,964 cf (2,509 cf above start)

Plug-Flow detention time= 1,530.1 min calculated for 0.050 af (60% of inflow)

Center-of-Mass det. time= 951.1 min (1,744.9 - 793.9)

Volume	Invert	Avail.Storage	Storage Description
#1	297.50'	12,130 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.50	59	0	0
298.00	94	38	38
300.00	266	360	398
301.50	510	582	980
302.00	1,387	474	1,455
304.00	1,929	3,316	4,771
306.00	2,521	4,450	9,221
307.00	3,297	2,909	12,130

Device	Routing	Invert	Outlet Devices
#1	Primary	293.00'	24.0" Round Culvert L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 293.00' / 288.00' S= 0.0909 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	302.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	305.50'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	306.00'	4.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

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Type II 24-hr WQv Rainfall=0.90"

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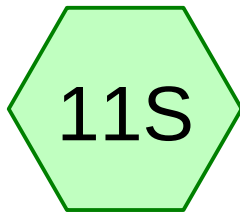
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Primary OutFlow Max=0.03 cfs @ 15.78 hrs HW=303.57' (Free Discharge)

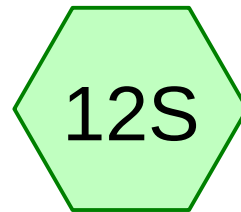
↑ **1=Culvert** (Passes 0.03 cfs of 46.79 cfs potential flow)
↑ **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 5.95 fps)
↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)



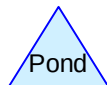
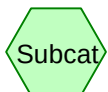
DA1 Pre



DA2 Pre



S/N 001



Routing Diagram for 16-077 - Design 2016 0629

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Summary for Subcatchment 11S: DA1 Pre

Runoff = 3.45 cfs @ 12.02 hrs, Volume= 0.227 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=3.20"

Area (ac)	CN	Description
* 0.873	98	Impervious, HSG A
* 0.026	98	Impervious, HSG C
0.768	30	Woods, Good, HSG A
0.109	55	Woods, Good, HSG B
0.284	39	>75% Grass cover, Good, HSG A
0.030	74	>75% Grass cover, Good, HSG C
2.090	62	Weighted Average
1.191		56.99% Pervious Area
0.899		43.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0500	0.21		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 2.30"
2.9	230	0.0350	1.31		Shallow Concentrated Flow, Grass
					Short Grass Pasture Kv= 7.0 fps
0.3	58	0.3790	3.08		Shallow Concentrated Flow, Woods
					Woodland Kv= 5.0 fps
11.2	388	Total			

Summary for Subcatchment 12S: DA2 Pre

Runoff = 4.22 cfs @ 12.07 hrs, Volume= 0.318 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=3.20"

Area (ac)	CN	Description
* 1.183	98	Impervious, HSG A
* 0.059	98	Impervious, HSG C
0.705	30	Woods, Good, HSG A
0.385	55	Woods, Good, HSG B
0.720	39	>75% Grass cover, Good, HSG A
0.029	61	>75% Grass cover, Good, HSG B
0.021	74	>75% Grass cover, Good, HSG C
3.102	63	Weighted Average
1.860		59.96% Pervious Area
1.242		40.04% Impervious Area

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Type II 24-hr 10-year Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		Sheet Flow, Grass Grass: Short n= 0.150 P2= 2.30"
2.0	170	0.0400	1.40		Shallow Concentrated Flow, Grass Short Grass Pasture Kv= 7.0 fps
1.7	140	0.0780	1.40		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	92	0.2600	7.52	7.05	Trap/Vee/Rect Channel Flow, Wooded drainage path Bot.W=3.00' D=0.25' Z= 3.0 '/' Top.W=4.50' n= 0.035 Earth, dense weeds
15.5	502	Total			

Summary for Reach 14R: S/N 001

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.192 ac, 41.24% Impervious, Inflow Depth = 1.26" for 10-year event
 Inflow = 7.54 cfs @ 12.04 hrs, Volume= 0.545 af
 Outflow = 7.54 cfs @ 12.04 hrs, Volume= 0.545 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Project Name: Colchester Avenue Housing

Discharge Point: S/N001

Extreme Flood Protection Standard Treatment Standard Waiver Worksheet

Fill out this worksheet for each discharge point in which use of this waiver is sought.

Extreme Flood Protection Standard Treatment Standard (Qp100) Waiver (*check only one*):

- ☐ 1. The site directly discharges to a large reservoir, lake or stream with a drainage area greater than or than ten (10) square miles.

Name of Receiving Water at Discharge Point:

Drainage Area of Receiving Water at Discharge Point (square miles):

Guidance: "Directly discharges" means that the runoff from the project does not reach any water of the State before discharging to the waterbody with a equal or greater than 10 square mile watershed. If the discharge point definition is unclear, refer to the Schedule A document and/or contact the Stormwater Program.

- ☒ 2. The impervious area is less than or equal to ten (10) acres.

Enter the new/expanded impervious area (acres):

2.676

Guidance: The ten (10) acre treatment requirement applies to only new impervious – created since July 4, 2005.

- ☐ 3. A downstream analysis is conducted that indicates extreme flood control is not necessary for the site.

Has adequate conveyance from the site to the discharge point been verified?

☐ Yes

☐ No

Has supporting information (e.g. narrative description, calculations, modeling) been included?

☐ Yes

☐ No

Note: These waivers are applied per receiving water.

Vermont Stormwater Discharge Permit Application

Schedule A

Fill out one Schedule A for each discharge point. For each Standard Treatment Practice (STP), Credit or Waiver specified, a STP, Credit, and/or Waiver worksheet must also be included.

Line	General Discharge Point Information	
1	Project name	Colchester Avenue Housing
2	Discharge point serial number (e.g. S/N 001)	S/N 001
3	Name of receiving water	Unnamed Wetland Tributary to the Winooski River
4	Latitude & Longitude of discharge point (Decimal Degree format with 6 digits to the right of the decimal):	44.481958 & 73.196706
5	Site area draining to discharge point (acres) = impervious + disturbed pervious	2.94
6		
On-site impervious area included for permit coverage <i>(Round to nearest 0.01 acre)</i>		
7	New Impervious area contributing stormwater runoff to discharge point (acres)	0.70
8	Redeveloped impervious area* contributing stormwater runoff to discharge point (acres)	0.44
9	Existing Impervious area* contributing to stormwater runoff to discharge point (acres)	0.32
10	Total	1.46
*DO NOT include impervious area unless it has met the Vermont Stormwater Treatment Standards 2002. If using the site balancing procedure refer to General Guidance Document.		
Water Quality (0.9 inches) Treatment Standard (WQ)		
11	STP used (e.g. Grass Channel O-3)	ED Wetland (W-2)
12	Voluntary Stormwater Management Credits applied (e.g. Grass Channel Credit 3.5)	N/A
Groundwater Recharge Treatment Standard (Re)		
13	Criterion applicable? (Yes or No) If No, indicate waiver applied	No
14	STP used (e.g. Grass Channel O-3)	
15	Voluntary Stormwater Management Credits applied (e.g. Grass Channel Credit 3.5)	
Channel Protection (1-year) Treatment Standard (CP)		
16	Criterion applicable? (Yes or No) If No, indicate waiver applied	Yes
17	Warm or Cold Fish Habitat Designation (see Vermont Water Quality Standards)	Warm - 24 Hours/1440 Minutes
18	STP used (e.g. Wet Pond P-2)	ED Wetland (W-2)
Overbank (10-year) Flood Protection Treatment Standard (Qp10)		
19	Criterion applicable? (Yes or No) If No, indicate waiver applied	Yes
20	STP used (e.g. Dry Detention Pond LA-1)	ED Wetland (W-2)
21	Pre-development peak discharge rate (cfs)	7.54
22	Pre-routed, post-development peak discharge rate (cfs)	9.60
23	Routed, post-development peak discharge rate (cfs)	6.48
Extreme (100-year) Flood Protection Treatment Standard (Qp100)		
24	Criterion applicable? (Yes or No) If No, indicate waiver applied	No Impervious Area < 10 Acres
25	STP used (e.g. Dry Detention Pond LA-1)	
26	Pre-development peak discharge rate (cfs)	
27	Pre-routed, post-development peak discharge rate (cfs)	
28	Routed, post-development peak discharge rate (cfs)	

ED Shallow Wetland (W-2)

ED Shallow Wetland

Line Indicate the treatment standards met for the site area draining to this practice:

- 1 WQv ☒
 2 Cpv ☒
 3 Qp10 ☒
 4 Qp100 ☐

Water Quality Volume (WQv)

5	What is the WQv (cubic feet) for the site area draining to this practice (from WQv worksheets)?	4608
---	---	------

Feasibility (2.7.2.A)		Response	Attachment location
6	Have you performed a site evaluation to establish the Hazard Classification of the wetland?	yes / no	
7	Have you determined depth to bedrock and soil properties using geotechnical investigations?	Yes	

Conveyance (2.7.2.B)		Response	Attachment location
8	Are the inflow to outflow flowpath points maximized?	Yes	Plans
9	Is the flowbath across the wetland a minimum of 2:1 (length to width ratio)?	Yes	Plans
10	Have the outfalls been designed/protected to avoid erosive velocities?	Yes	Plans

Pretreatment (2.7.2.C)		Response	Attachment location
11	Has pre-treatment been provided for non-rooftop runoff?	Yes	Plans
12	Have forebays been provided at every inlet with 10% or more of the total inflow to the wetland?	No	Equivalent provided
13	Is the forebay 4 to 6 feet deep?	N/A	Equivalent provided
14	Has the forebay been designed with non-erosive outlet conditions?	N/A	Equivalent provided
15	Has direct access to the forebay been provided for maintenance?	N/A	Equivalent provided

16	What volume (cubic feet) of water is the forebay or equivalent upstream pre-treatment is sized to contain?	
----	--	--

Treatment (2.7.2.D)		Response	Attachment location
17	Is the surface area of the wetland at least 0.35% of the contributing drainage area?	Yes	Narrative/Plans
18	Has the wetland been designed with at least 25% of the WQv in deep zones of greater than four feet?	Yes	Narrative/Plans
19	Is at least 35% of the wetland less than or equal to six inches deep?	Yes	Narrative/Plans
20	Is at least 65% of the wetland shallower than 18 inches?	Yes	Narrative/Plans
21	Is the extended detention portion of the WQv no more than 50% of the total WQv?	Yes	Narrative/Modelling
22	Does the maximum water surface elevation extend no more than three feet above the permanent pool?	Yes	Modelling
23	Is the extended detention portion of the WQv released over 24 hours?	No	1" orifice provided
24	Is the length to width ratio for the main cell of the wetland equal to or greater than 1.5:1?	Yes	Plans

25	What volume (cubic feet) of the WQv is contained within the permanent pool?	1455
----	---	------

Landscaping (2.7.2.E)		Response	Attachment location
26	Is the main cell of the wetland 4 feet or greater in depth (do not include forebay)? If no, skip to Line 31.	Yes	Plans
27	Are the side slopes of the wetland 4:1 (h:v) or flatter?	No	
28	Is the wetland fenced?	Yes	
29a	yes → Does the pond have a safety bench of at least 6% grade extending at least 6 feet from the normal water edge?	Yes	
29b	no → Does the pond have a safety bench of at least 6% grade extending generally 15 feet from the normal water edge?		
30	Does the wetland have an aquatic bench with an irregular configuration at a maximum depth of 18 inches, extending up to 15 feet from the normal water level edge?	Yes	Plans
31	Have all the required elements of the landscaping plan been addressed?	Yes	Plans

Maintenance (2.7.2.F)		Response	Attachment location
32	Is the principal spillway accessible from land and equipped with a removable trash rack?	Yes	Plans

Cold Climate Design Considerations (2.7.2.G)		Response	Attachment location
33	Have the potential impacts of Vermont's severe winter climate been addressed in your design?	Yes	Plans

Pond Stage Storage and Outlet Information	
34	At what elevation (feet) does the storage begin during the larger (> 0.9") storm events?
	303.57

		Response	Attachment location
35	Does the application include outlet elevation and size information for the wetland?	Yes	Plans
36	Has peak storage volume and elevation information for the 1, 10 and 100-year storms been included?	Yes	Modelling

Channel Protection Treatment Standard (Cpv)		Response
37	Check which detention time standard must be used, based on the fisheries designation of the receiving water:	☐ 12 hours for cold water ☒ 24 hours for warm water

		Response	Attachment location
38	Did you use the Storage Volume Estimation Method? If yes, skip to Line 43.*	No	

*Please review the guidance sheet "Channel Protection Storage Volume Estimation" and attach the specified information. This method is not appropriate if more than a one subwatershed drains to the practice. Using the center of mass detention time calculated by a hydrologic model that accounts for pond routing is the preferred method.

39	What storage volume (cubic feet) is necessary to meet the Channel Protection Standard?	
40	What orifice size (inches) is necessary to meet the required detention time?	
41	What is the calculated average release rate (cfs)?	
42	What is the controlled peak release rate (cfs) during the 1-year storm as indicated by the model?	

Overbank Flood Protection Treatment Standard (Qp10)		Response	Attachment location
43	Have you demonstrated that Qp10 post is less than or equal to Qp10 pre at the discharge point?*	Yes	Modelling

*Please include runoff and routing calculations of the 10-year storm event.

Extreme Flood Protection Treatment Standard (Qp100)		Response	Attachment location
44	Have you demonstrated that Qp100 post is less than or equal to Qp100 pre at the discharge point?*	N/A	

*Please include runoff and routing calculations of the 100-year storm event.

See VSMM-Vol. I, Table 2.5 for guidance regarding wetland design variants. Larger storm volumes should begin at the level of the permanent pool. While the Channel Protection Treatment Standard only applies to the site, ensure that appropriate overflow outlets are designed to safely release off-site water that may also be entering the wetland. Visit VSMM-Vol. II, Appendix D7 for guidance about maintaining non-erosive conditions.

Attachment location: Indicate the specific location (i.e. appendix, page, plan sheet) where the requisite support documentation has been provided within the application.

Version: 9/06

For the area draining to*:

Located in drainage area for S/N:

001

WQ Volume Calculation for Volume-Based Practice

Use this worksheet to calculate the water quality volume draining to your volume based STP if you are not using any of the site design credits in section 3 of the 2002 VSWMM. Do not use this worksheet to calculate your WQv if you need to determine the Peak Q for the WQ storm (i.e. designing a grass channel, flow-splitter or other flow based practice). See the worksheet "Water Quality Volume and Modified Curve Number Calculation for Water Quality Treatment in a Flow-Based Practice"

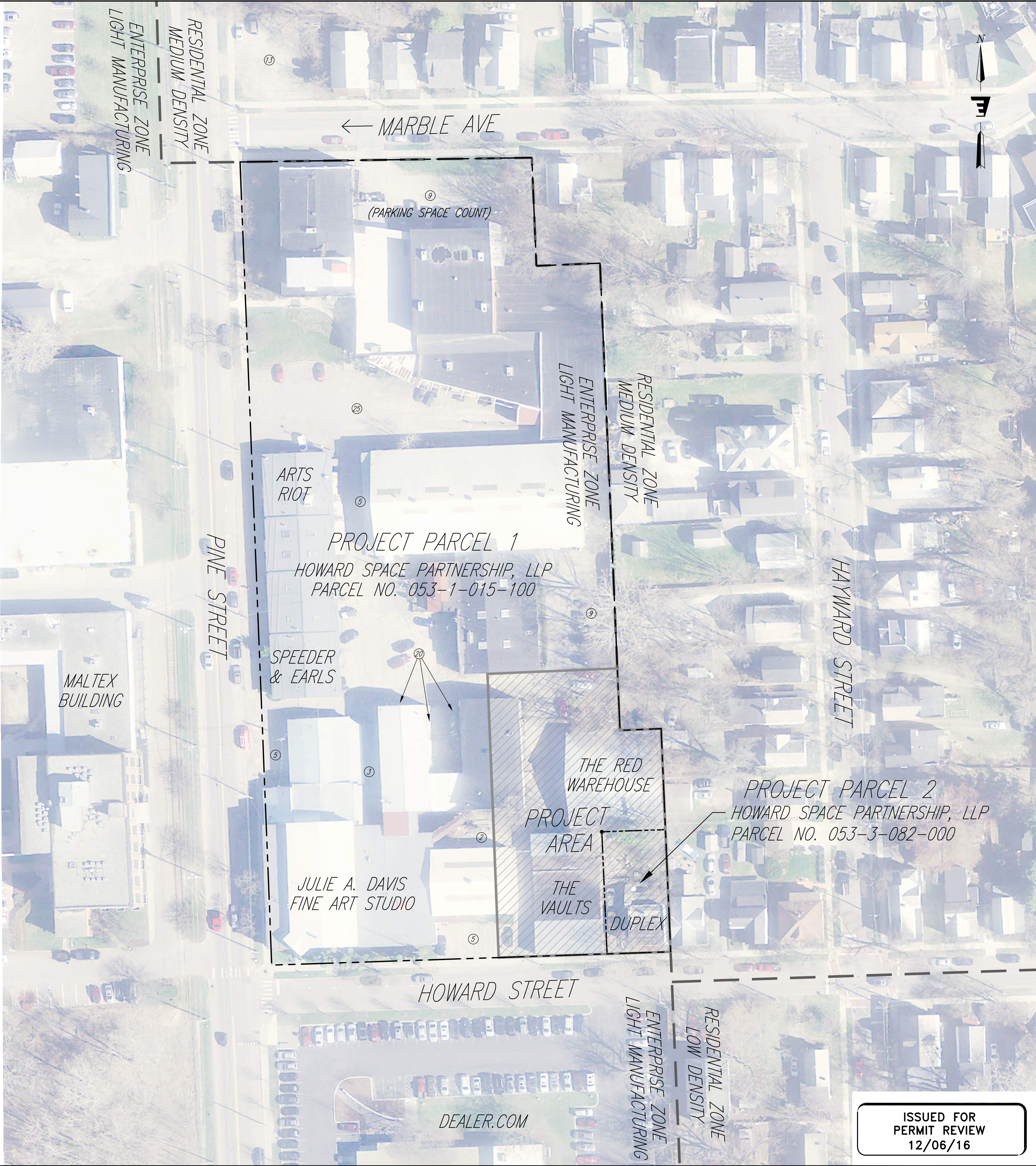
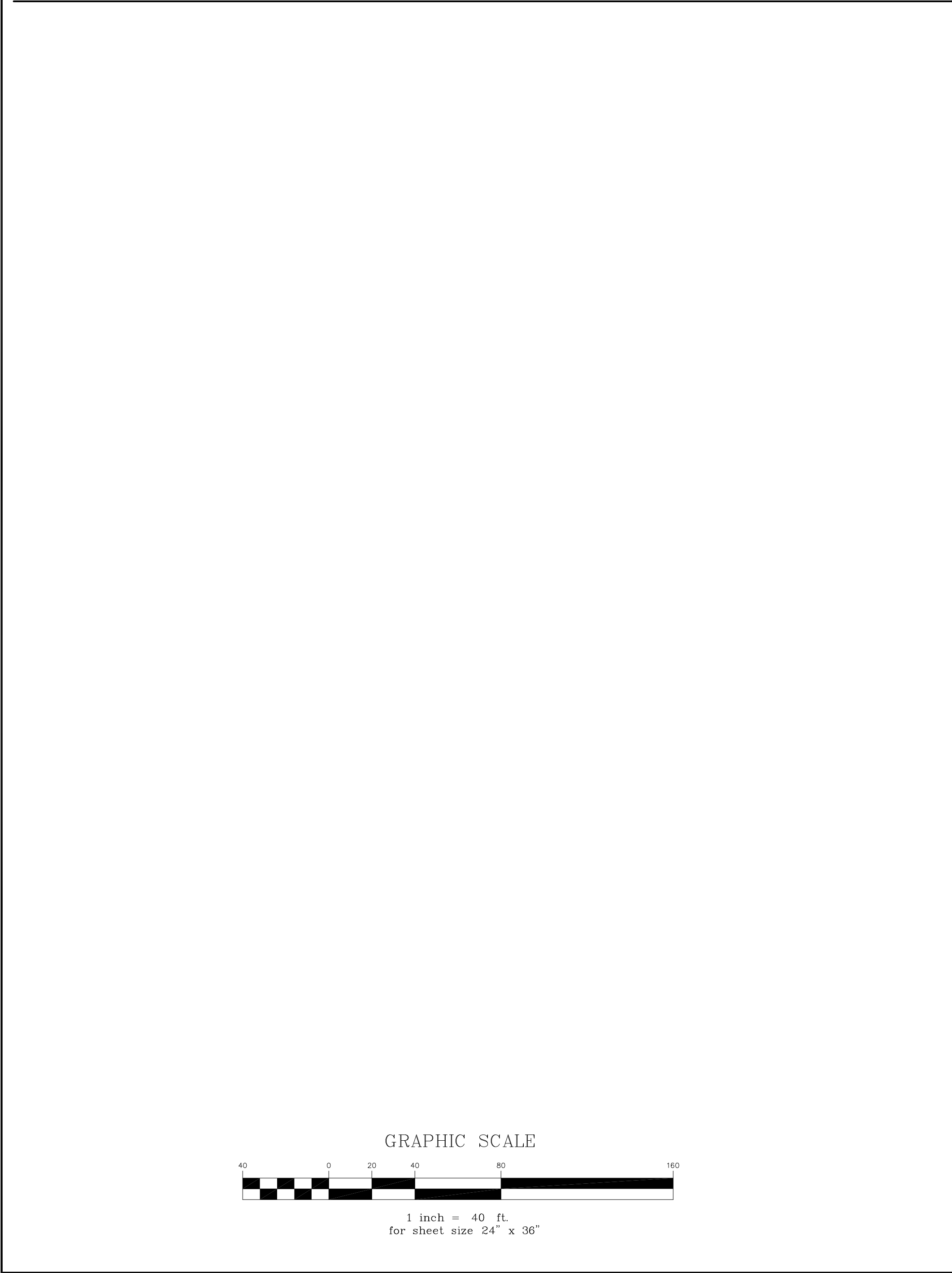
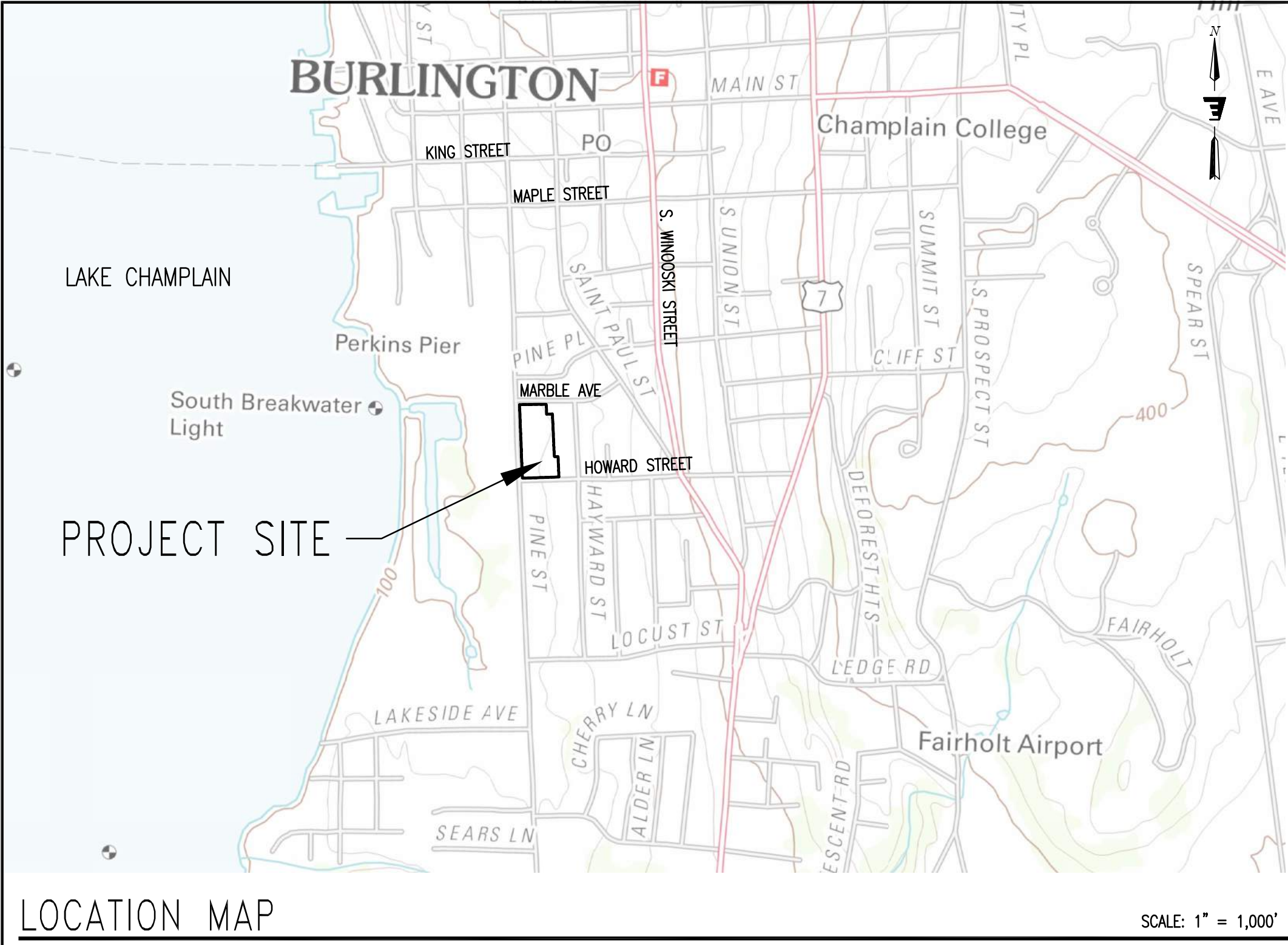
Water Quality Volume Calculations

Line		value/calculation	units
1	Site Area (impervious + disturbed pervious) A =	2.09	acres
2	Impervious area	1.45	acres
3	Percent Impervious Area = [(line 2/line 1) * 100] = I =	69.43	% (whole #)
4	Precipitation P =	0.9	inches
5	Runoff coefficient calculation = $(0.05 + (0.009 * I))$ Rv =	0.675	
6	WQ Volume (in watershed inches) Calculation = $(P * Rv) =$	0.607	Qa (watershed inches, a.k.a. inches of runoff)
7	Minimum WQ Volume ¹	0.2	watershed inches
8	Enter the greater of line 6 or line 7 WQv =	0.607	watershed inches
9	WQ Volume Calculation = $(\text{line 8} * A)/12 =$ WQv =	0.106	ac. ft.
10	WQ Volume Calculation = $(\text{line 9} * 43560) =$ WQv =	4608	cu. ft.

Notes:

1: Sites with low impervious cover (~19%) but that do not employ a significant use of the stormwater design credits in Section 3 of the VSWMM are required to treat the minimum water quality volume of 0.2 watershed inches. Sites that have a significant portion of their impervious cover addressed via the stormwater credits (section 3 of the VSWMM) will be able to reduce this WQv and will only be required to treat the volume calculated on the "WQ Volume (with credit reduction)" worksheet which will be less than the 0.2 watershed inches.

* Enter the name of the STP (both type and label) which has been designed to treat this particular WQv (e.g. Wet Pond #2)



Stamp

Rev. No.	Description	Chkd.

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Client:
Unsworth Properties, LLC
26 Railroad Avenue
Essex (802) 879-4504

Sheet Title:
Overall Existing Conditions Plan

Project Title:
The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By: KW/HKW
Checked By: KW
Drawn By: HKW
Scale: 1" = 40'
Date: 12/06/16

ISSUED FOR
PERMIT REVIEW
12/06/16

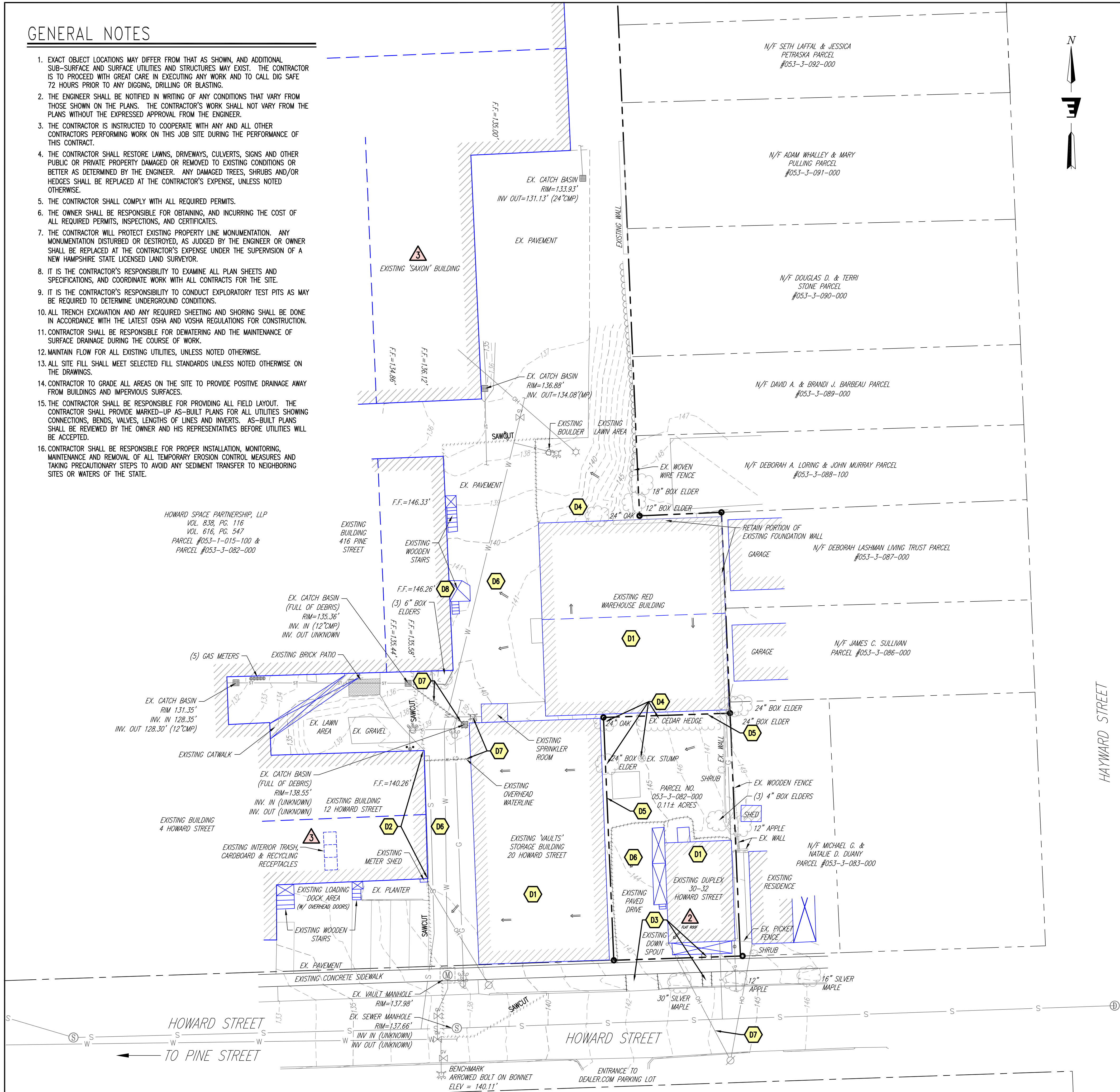
C0.1

EV#16414

GENERAL NOTES

1. EXACT OBJECT LOCATIONS MAY DIFFER FROM THAT AS SHOWN, AND ADDITIONAL SUB-SURFACE AND SURFACE UTILITIES AND STRUCTURES MAY EXIST. THE CONTRACTOR IS TO PROCEED WITH GREAT CARE IN EXECUTING ANY WORK AND TO CALL DIG SAFE 72 HOURS PRIOR TO ANY DIGGING, DRILLING OR BLASTING.
2. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY CONDITIONS THAT VARY FROM THOSE SHOWN ON THE PLANS. THE CONTRACTOR'S WORK SHALL NOT VARY FROM THE PLANS WITHOUT THE EXPRESSED APPROVAL FROM THE ENGINEER.
3. THE CONTRACTOR IS INSTRUCTED TO COOPERATE WITH ANY AND ALL OTHER CONTRACTORS PERFORMING WORK ON THIS JOB SITE DURING THE PERFORMANCE OF THIS CONTRACT.
4. THE CONTRACTOR SHALL RESTORE LAWNS, DRIVEWAYS, CULVERTS, SIGNS AND OTHER PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO EXISTING CONDITIONS OR BETTER AS DETERMINED BY THE ENGINEER. ANY DAMAGED TREES, SHRUBS AND/OR HEDGES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE, UNLESS NOTED OTHERWISE.
5. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIRED PERMITS.
6. THE OWNER SHALL BE RESPONSIBLE FOR OBTAINING, AND INCURRING THE COST OF ALL REQUIRED PERMITS, INSPECTIONS, AND CERTIFICATES.
7. THE CONTRACTOR WILL PROTECT EXISTING PROPERTY LINE MONUMENTATION. ANY MONUMENTATION DISTURBED OR DESTROYED, AS JUDGED BY THE ENGINEER OR OWNER SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER THE SUPERVISION OF A NEW HAMPSHIRE STATE LICENSED LAND SURVEYOR.
8. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE ALL PLAN SHEETS AND SPECIFICATIONS, AND COORDINATE WORK WITH ALL CONTRACTS FOR THE SITE.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONDUCT EXPLORATORY TEST PITS AS MAY BE REQUIRED TO DETERMINE UNDERGROUND CONDITIONS.
10. ALL TRENCH EXCAVATION AND ANY REQUIRED SHEETING AND SHORING SHALL BE DONE IN ACCORDANCE WITH THE LATEST OSHA AND VOSHA REGULATIONS FOR CONSTRUCTION.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING AND THE MAINTENANCE OF SURFACE DRAINAGE DURING THE COURSE OF WORK.
12. MAINTAIN FLOW FOR ALL EXISTING UTILITIES, UNLESS NOTED OTHERWISE.
13. ALL SITE FILL SHALL MEET SELECTED FILL STANDARDS UNLESS NOTED OTHERWISE ON THE DRAWINGS.
14. CONTRACTOR TO GRADE ALL AREAS ON THE SITE TO PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDINGS AND IMPERVIOUS SURFACES.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL FIELD LAYOUT. THE CONTRACTOR SHALL PROVIDE MARKED-UP AS-BUILT PLANS FOR ALL UTILITIES SHOWING CONNECTIONS, BENDS, VALVES, LENGTHS OF LINES AND INVERTS. AS-BUILT PLANS SHALL BE REVIEWED BY THE OWNER AND HIS REPRESENTATIVES BEFORE UTILITIES WILL BE ACCEPTED.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER INSTALLATION, MONITORING, MAINTENANCE AND REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES AND TAKING PRECAUTIONARY STEPS TO AVOID ANY SEDIMENT TRANSFER TO NEIGHBORING SITES OR WATERS OF THE STATE.

HOWARD SPACE PARTNERSHIP, LLP
VOL. 838, PG. 116
VOL. 616, PG. 547
PARCEL #053-1-015-100 &
PARCEL #053-3-082-000



LEGEND

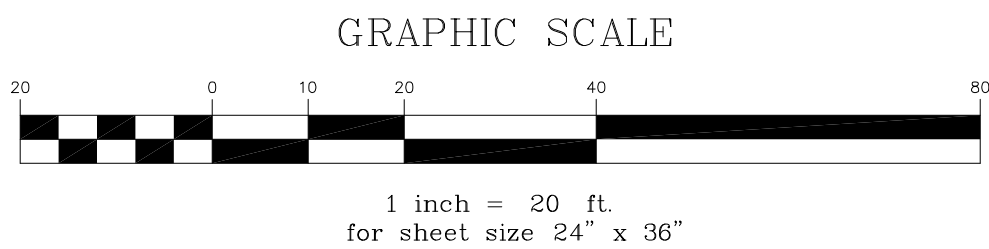
EXISTING FEATURES	PROPOSED FEATURES

DEMOLITION SCHEDULE

- | | | | |
|----|-----------------------|----|--|
| D1 | EXISTING BUILDING | D5 | EXISTING PROPERTY LINE TO BE DISSOLVED AND LOTS MERGED |
| D2 | EXISTING SIDING | D6 | EXISTING PAVEMENT |
| D3 | EXISTING CONCRETE | D7 | EXISTING UTILITY LINE/STRUCTURE |
| D4 | EXISTING TREES/SHRUBS | D7 | EXISTING LOADING DOCK |

SURVEY NOTES

1. EXISTING PHYSICAL FEATURES AND TOPOGRAPHY SHOWN HERE ARE BASED ON A PLAN ENTITLED "SITE PLAN OF LANDS OF HOWARD SPACE PARTNERSHIP, LLP, 30 HOWARD ST & 400 PINE ST, BURLINGTON, VERMONT", PREPARED BY TERRY W. WILSON, VERMONT LICENSED LAND SURVEYOR AND DATED JULY 2016.
2. PROPERTY LINES DEPICTED HERE ARE TAKEN FROM A PLAT ENTITLED "PLAT OF A PORTION OF LANDS OF HOWARD SPACE PARTNERSHIP, LLP, 30 HOWARD ST & 400 PINE ST, BURLINGTON, VERMONT", PREPARED BY VERMONT MAPPING AND SURVEY CO., LLC, DATED JULY, 2016. THE PURPOSE OF SAID PLAT IS TO DEPICT LOT #053-3-082-000 AND THE EASTERLY LINE OF LOT #053-1-015-100. REFER TO PLAT FOR ADDITIONAL NOTES AND REFERENCES.
3. UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES. EXISTING UTILITIES SHOWN ON PLANS WERE TAKEN FROM THE ABOVE REFERENCED PLAN AND ARE NOT GUARANTEED TO BE ACCURATE OR COMPLETE. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING UTILITY LOCATIONS PRIOR TO COMMENCING WORK. NOTIFY ENGINEER OF ANY DISCREPANCY BETWEEN UTILITIES AS SHOWN AND AS FOUND. THE CONTRACTOR SHALL CONTACT DIG SAFE (811 or 888-344-7233) A MINIMUM OF 72 HOURS, BUT NOT INCLUDING SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS, PRIOR TO ANY CONSTRUCTION.
4. NORTH ORIENTATION IS REFERENCED TO VERMONT GRID NORTH & ELEVATIONS ARE REFERENCED TO NAVD 88.



ISSUED FOR
PERMIT REVIEW
12/06/16

Stamp			
Rev.	No.	Description	Chkd.
12/22/16	1	UPDATES FOR CITY STORMWATER SUBMISSION	KW
01/09/17	2	REVISIONS IN RESPONSE TO P&Z COMMENTS	KW

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www.engineeringventures.com

Client: Unsworth Properties, LLC
26 Railroad Avenue
Essex (802) 879-4504

Sheet Title: Existing Conditions & Demolition Plan
Project Title: The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By:	KW/HKW
Checked By:	KW
Drawn By:	HKW
Scale:	1" = 20'
Date:	12/06/16

C1.0
EV#16414

SITE WORK SCHEDULE

- C1

PROPOSED PAVEMENT
- C2

PROPOSED CONCRETE
- C3

PROPOSED CONCRETE CURB
- C4

PROPOSED STAIRS
- C5

PROPOSED 30' LONG RAMP AT MAX. 1:12 SLOPE
- C6

PROPOSED LANDING
- C7

PROPOSED BIKE RACK
- C8

PROPOSED 4' X 8' LOADING DOCK
- C9

PROPOSED TRASH/RECYCLING LOCATIONS & PATH OF TRAVEL
- C10

PROPOSED SNOW STORAGE AREA

STORMWATER SCHEDULE

- ST1

PROPOSED TRENCH DRAIN
RIM = 134.50
INV. OUT = 133.00
- ST2

PROPOSED CATCH BASIN
RIM = 134.00
INV. IN = 132.67
INV. OUT = 132.57
- ST3

PROPOSED CATCH BASIN
RIM = 134.00
INV. IN = 131.89
INV. OUT = 131.79
- ST4

PROPOSED STORM MANHOLE
RIM = 140.0
INV. IN (ST3) = 131.36
INV. IN (ST5) = 131.13
INV. IN (ST8) = 135.47
INV. OUT = 131.00
- ST5

PROPOSED STORMWATER DETENTION TANK
- ST6

PROPOSED GRASSED SWALE AT 2% SLOPE
- ST7

PROPOSED RAIN GARDEN FOREBAY WITH YARD DRAIN
- ST8

PROPOSED RAIN GARDEN WITH YARD DRAIN
- ST9

PROPOSED ROOF DRAIN
- ST1

TO ST2 33LF OF 12" HDPE AT 1% SLOPE
- ST2

TO ST3 68LF OF 12" HDPE AT 1% SLOPE
- ST3

TO ST4 43LF OF 12" HDPE AT 1% SLOPE
- ST5

TO ST4 7LF OF 12" HDPE AT 1% SLOPE
- ST4

TO EX. 61LF OF 12" HDPE
- ST7

TO ST8 36LF OF 8" PVC AT 1% SLOPE
- ST8

TO ST4 28LF OF 8" PVC AT 1% SLOPE

UTILITY SCHEDULE

- SS1

PROPOSED 6" PVC SEWER SERVICE LINE @ MIN. 2% SLOPE
- W1

PROPOSED 6" D.I. WATER SERVICE LINE
- E1

PROPOSED UNDERGROUND ELECTRIC LINE

LOT COVERAGE CALCULATION

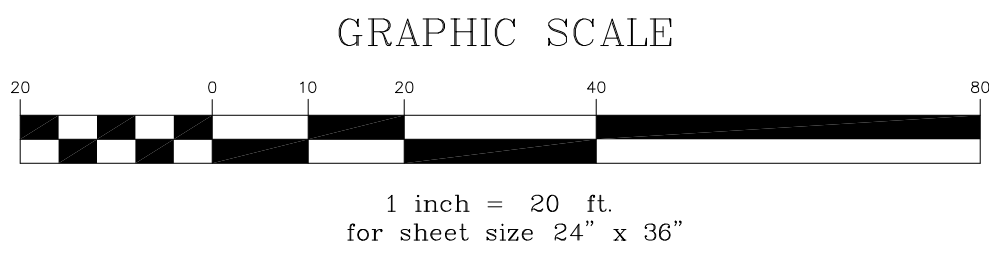
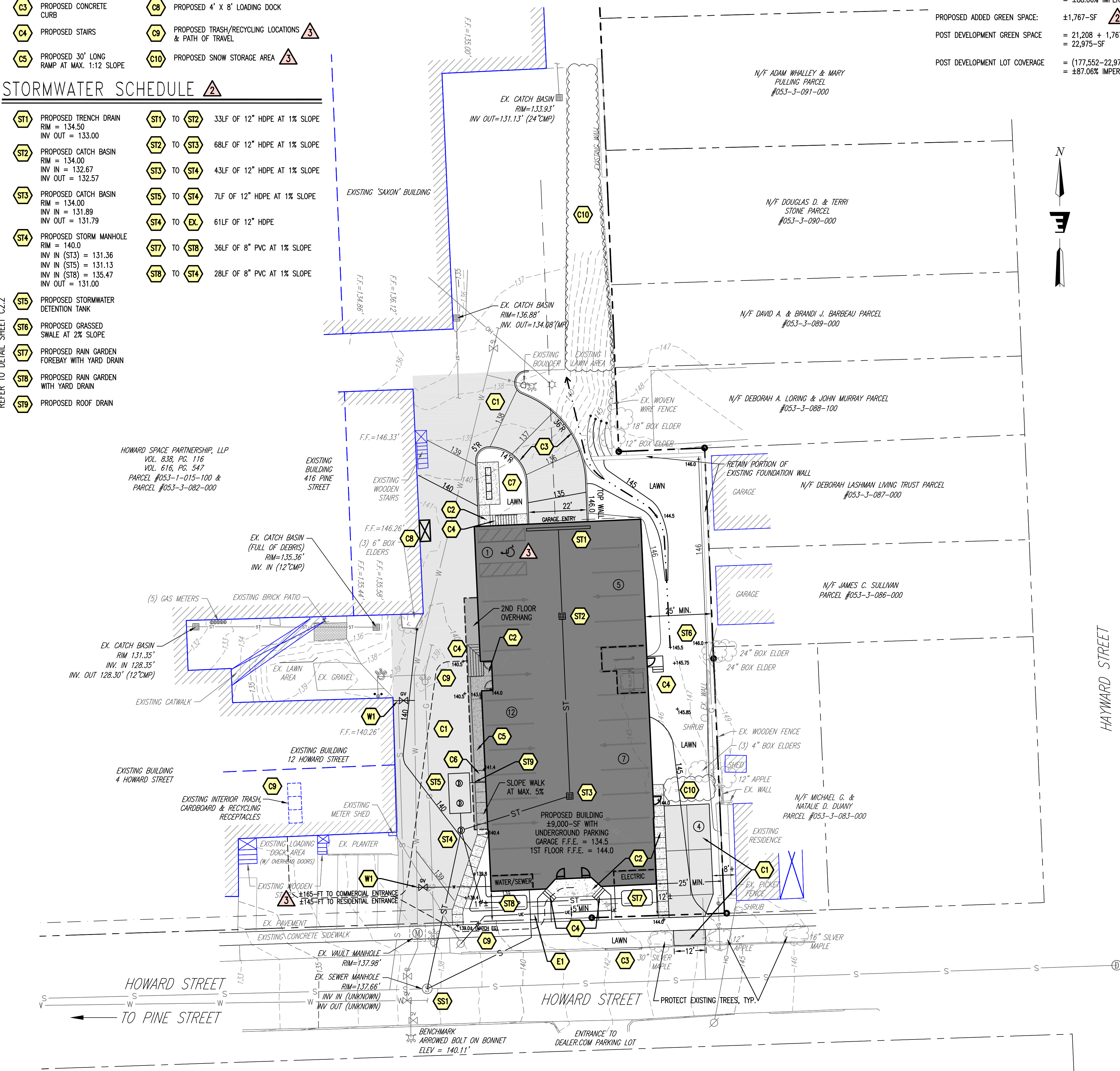
TOTAL COMBINED LOT AREA: ±177,552-SF
EXISTING GREEN SPACE: ±21,208-SF *estimated from aerial photography
EXISTING LOT COVERAGE = $(177,552-21,208)/177,552 \times 100$
= ±88.06% IMPERVIOUS
PROPOSED ADDED GREEN SPACE: ±1,767-SF
POST DEVELOPMENT GREEN SPACE = 21,208 + 1,767
= 22,975-SF
POST DEVELOPMENT LOT COVERAGE = $(177,552-22,975)/177,552 \times 100$
= ±87.06% IMPERVIOUS

LEGEND

EXISTING FEATURES	PROPOSED FEATURES
	CLEAN OUT
	SEWER MANHOLE
	CATCH BASIN
	STORM MANHOLE
	TAPPING SLEEVE AND VALVE
	BOLLARD
	GATE VALVE
	HYDRANT
	POST INDICATOR VALVE
	WATER SHUT OFF
	GAS SHUT OFF
	GAS METER
	LIGHT POLE
	UTILITY POWER POLE
	IRON PIPE/REBAR
	SOIL BORING
	SIGN
	SPOT ELEVATION
	TREE
	PARKING SPACE COUNT
	HANDICAP SYMBOL
	TREELINE
	FENCE
	5' CONTOUR INTERVAL
	1' CONTOUR INTERVAL
	PROPERTY LINE
	EDGE OF PAVEMENT/HARDSCAPE
	SANITARY SEWER LINE
	STORM LINE
	WATER LINE
	UNDERGROUND ELECTRIC
	OVERHEAD ELECTRIC
	UNDERGROUND TELEPHONE
	GAS LINE
	RIGHT-OF-WAY LINE
	SETBACK
	SNOW STORAGE AREA

PROPOSED SURFACES LEGEND

-
- PROPOSED BUILDING

PROPOSED PAVEMENTPROPOSED CONCRETE

ISSUED FOR PERMIT REVIEW
12/06/16

Stamp

Chkd.	Rev. No.	Description	12/08/16	CORRECTED LOT COVERAGE CALCULATION	KW
			12/22/16	UPDATES FOR CITY STORMWATER SUBMISSION	KW
			01/09/17	REVS IN RESPONSE TO P&Z COMMENTS	KW

ENGINEERING VENTURES PC

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Tel: 603.442.5333 • Fax: 603.442.5331
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Client:

Unsworth Properties, LLC
26 Railroad Avenue
East (802) 879-4504

Sheet Title:

Proposed Site Layout,
Grading & Utility Plan

Project Title:

The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By:

KW/HKW

Checked By:

KW

Drawn By:

HKW

Scale:

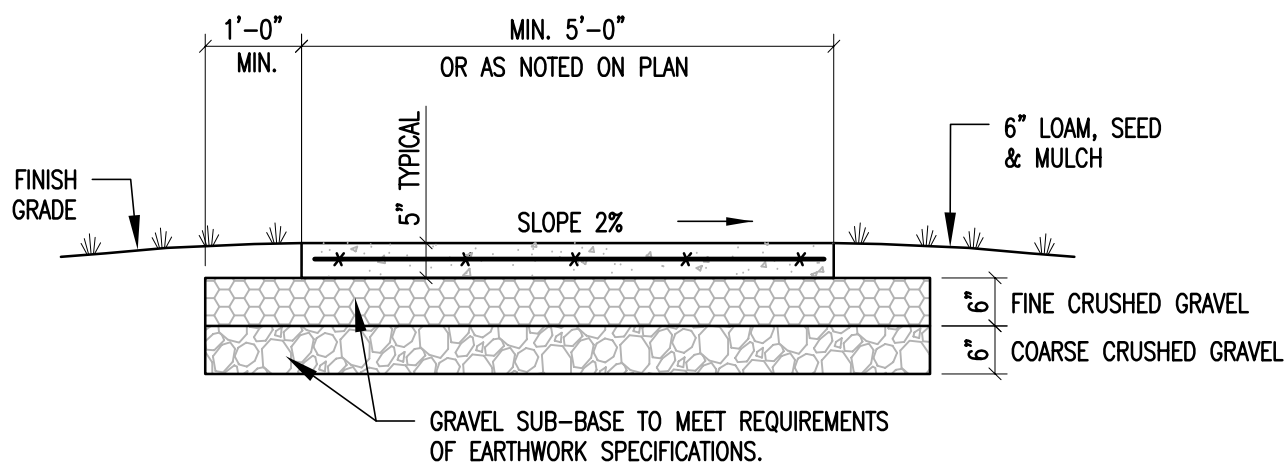
1" = 20'

Date:

12/06/16

C1.1

EV#16414

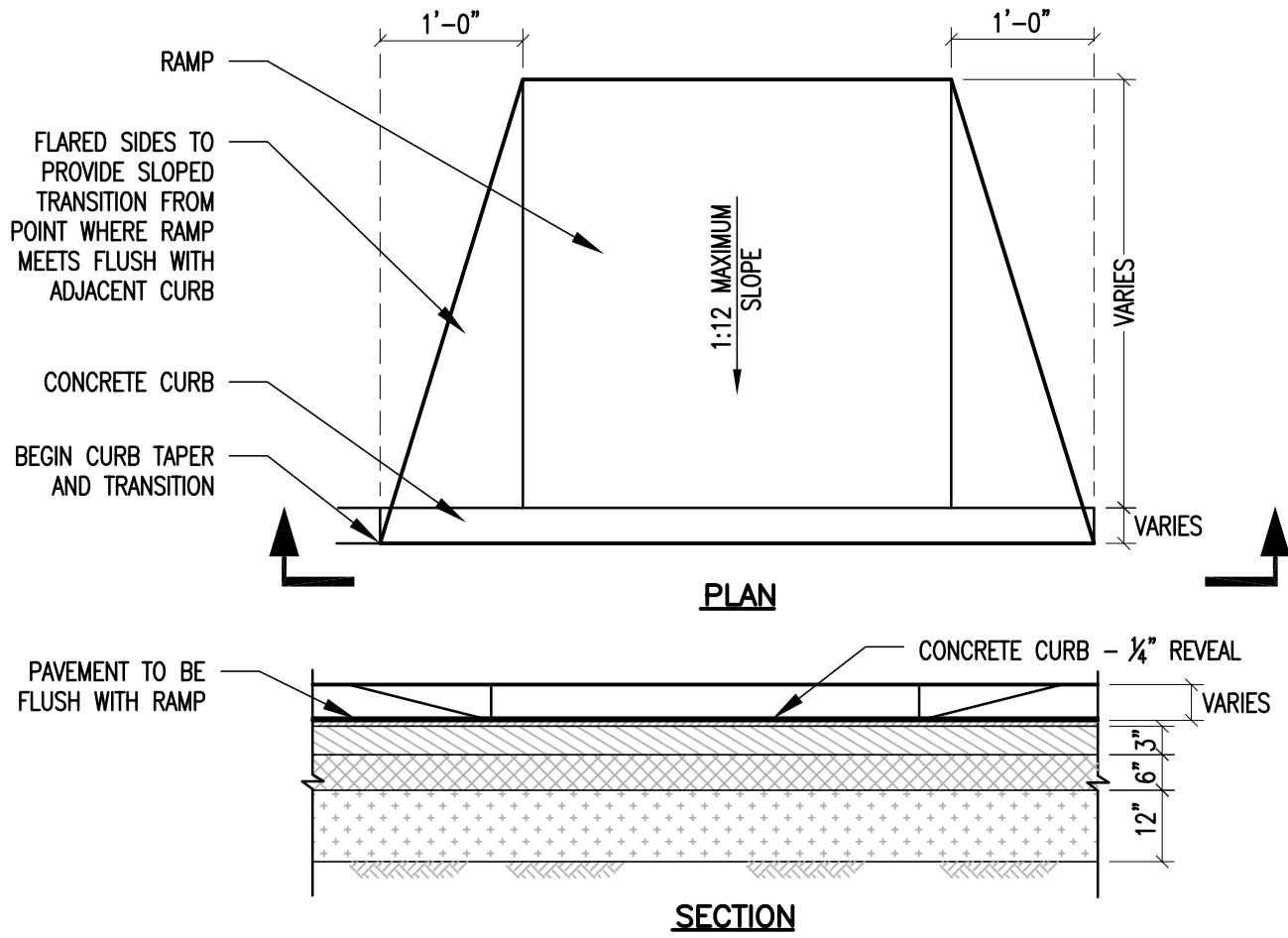


CONCRETE SIDEWALK NOTES:

1. PLACE A TOOLED JOINT 1/8" WIDE AND AT LEAST 1/3 OF THE DEPTH AT MINIMUM 4'-0"oc. OR AS NOTED ON PLANS.
2. PLACE EXPANSION JOINT EVERY 20'-0".
3. BROOM FINISH WITH SMOOTH TROWELED EDGES. TREAT WITH SILANE-SILOXANE OR EQUAL.
4. CAST-IN-PLACE CONCRETE TO BE 4000 psi CONCRETE, 5%-7% AIR ENTRAINMENT WITH 6x6-W4@W4.0 REINFORCING CENTERED IN SIDEWALK.
5. WHERE SIDEWALK IS ADJACENT TO ENTRY/EXIT DOOR PADS WITH FROST WALL FOUNDATIONS, SIDEWALK SHALL BE DOWELED TO PAD.
6. WHERE SIDEWALK IS ADJACENT TO OTHER HARDSCAPE FEATURES (CURB, WALL, LIGHTBASE, ETC.) SEPARATE WITH EXPANSION MATERIAL.

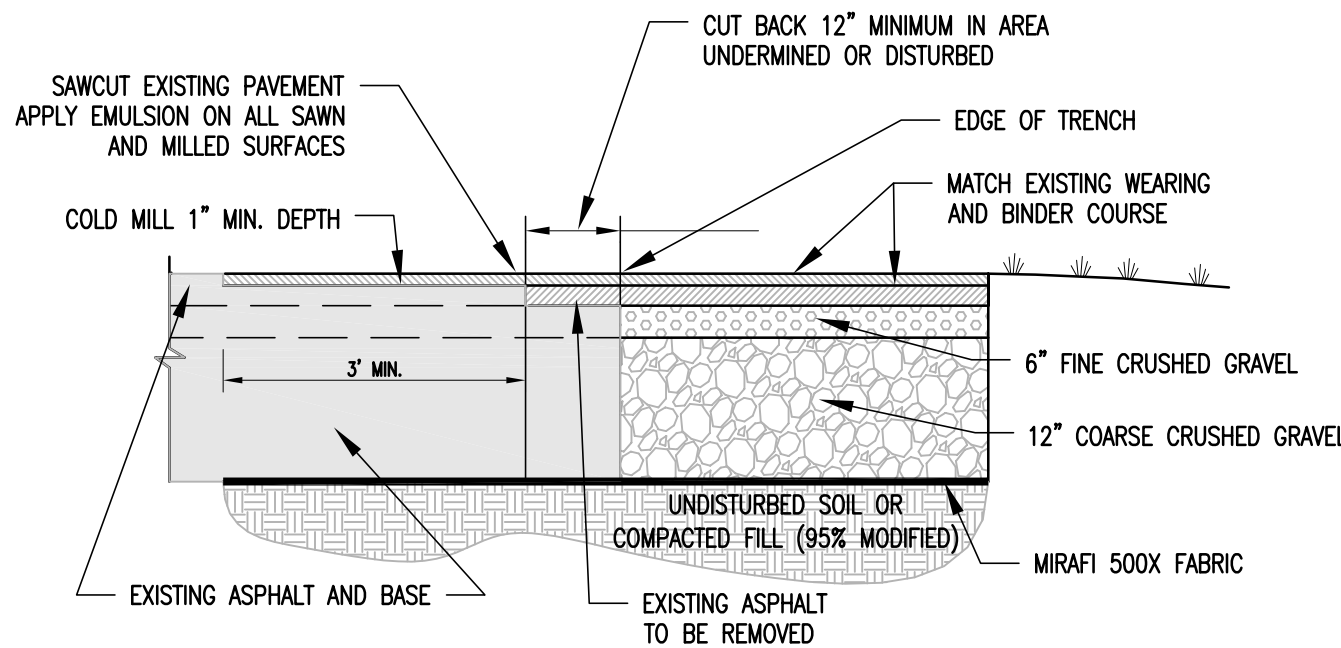
CONCRETE SIDEWALK DETAIL

NOT TO SCALE



HANDICAP RAMP/CURB CUT DETAIL

NOT TO SCALE

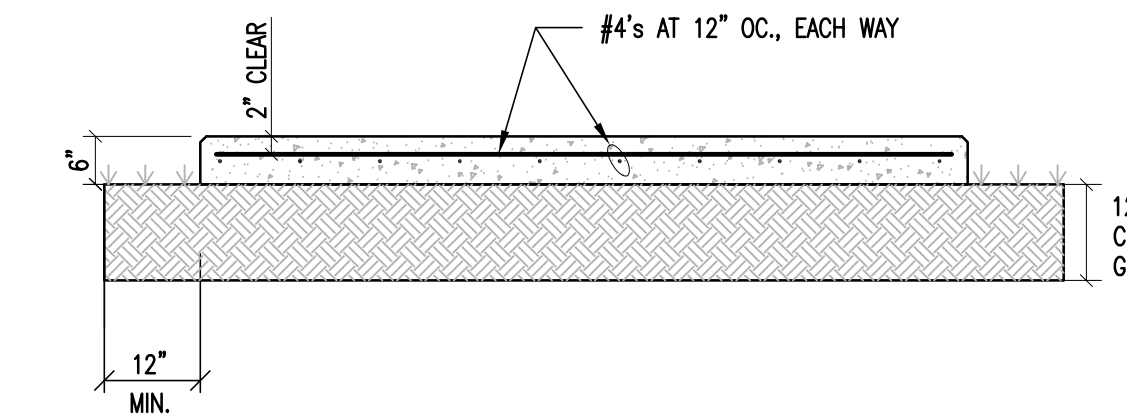


PAVEMENT PATCHING NOTES:

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.

PAVEMENT DETAIL

SCALE: NONE

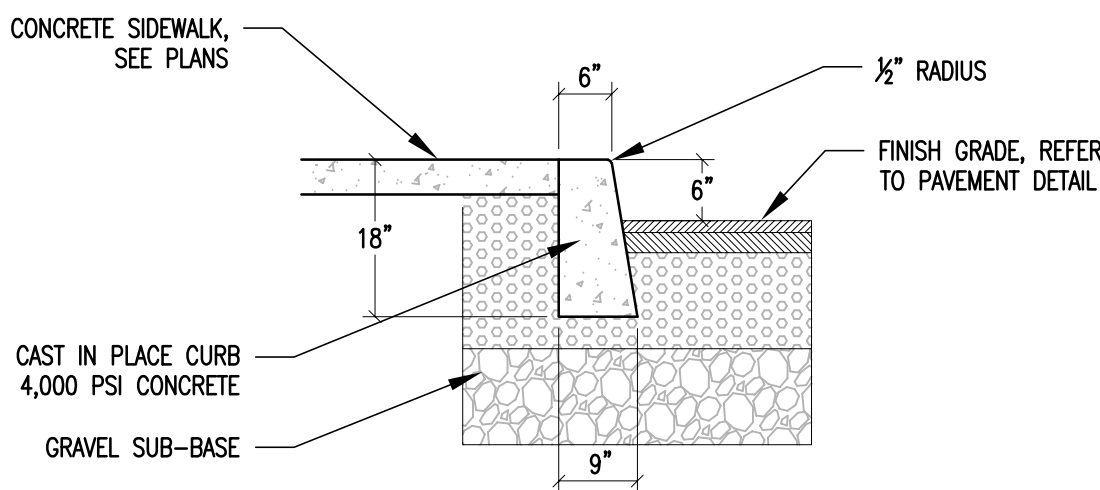


NOTES:

1. CONCRETE TO BE 4000psi WITH 5-7% AIR ENTRAINMENT.
2. BROOM FINISH WITH SMOOTH TROWELED EDGES. TREAT WITH SILANE-SILOXANE OR EQUIVALENT.
3. REFER TO LAYOUT PLAN FOR SIZE AND LOCATION.

EXTERIOR CONCRETE PAD DETAIL

SCALE: NONE

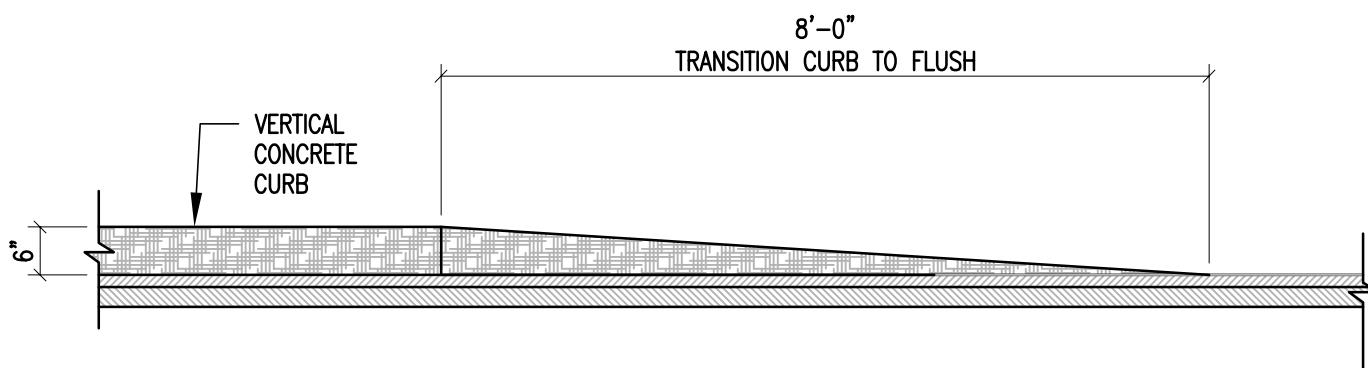


CONCRETE CURB NOTES:

1. CONSTRUCT CURBING IN 10'-0" SECTIONS WITH 1/8" JOINT BETWEEN SECTIONS
2. EXPANSION JOINTS AT 20'-0" oc. MAX
3. CONCRETE CURBS SHALL BE CONSTRUCTED IN ACCORDANCE WITH VIRTRANS SPECIFICATIONS.
4. INSTALL 1/2" EXPANSION MATERIAL BETWEEN CURB AND ADJACENT HARD FEATURES (SIDEWALK, LIGHT BASE, ETC.).

CONCRETE CURB DETAIL

SCALE: NONE

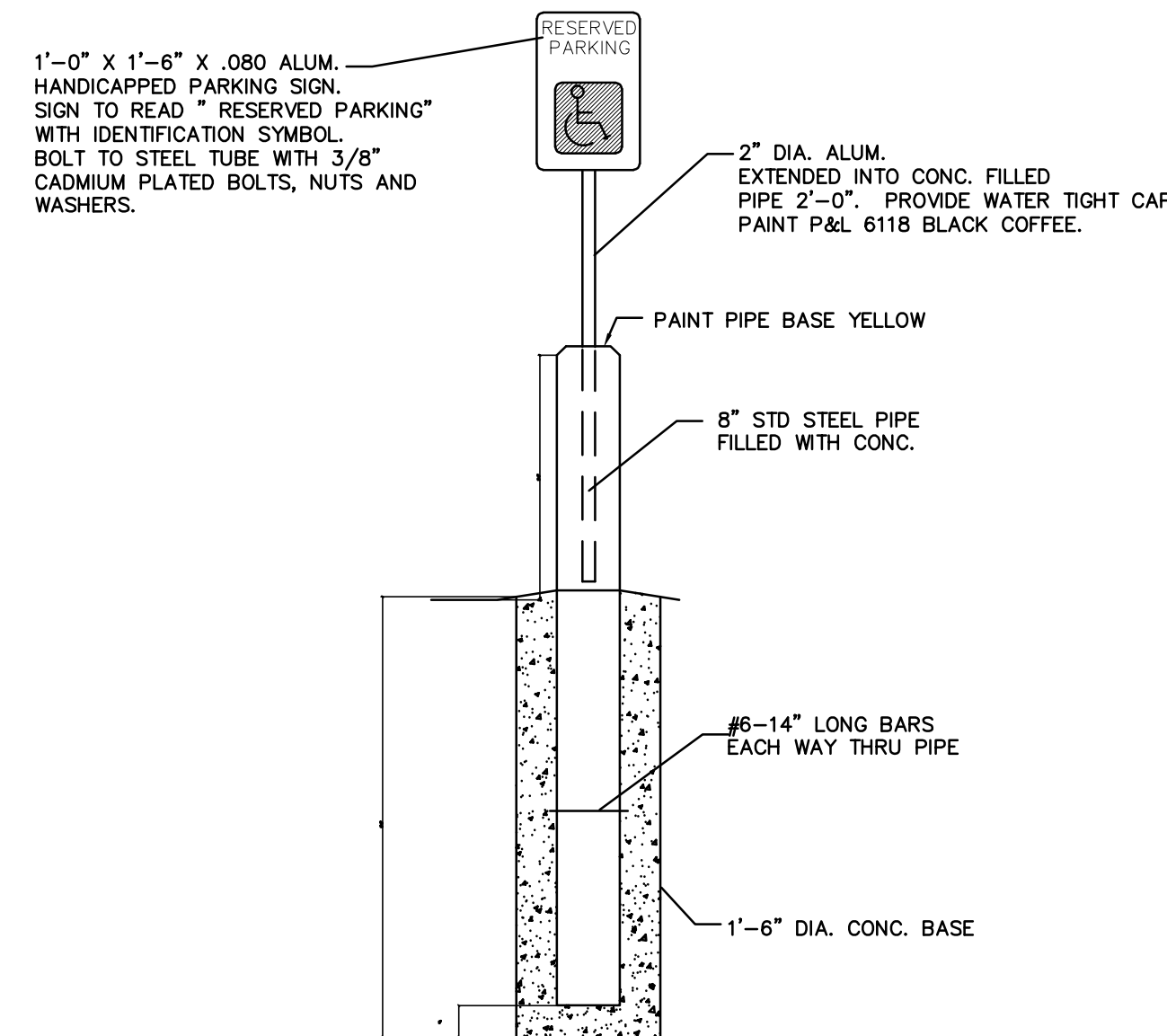


NOTE:

PAVEMENT DETAIL FOR SUB-BASE DETAILS.

TAPERED CONCRETE CURB DETAIL

NOT TO SCALE



PROPOSED HANDICAPPED PARKING SIGN

SCALE: NONE

EARTHWORK SPECIFICATIONS

1. PRIOR TO THE START OF THE WORK, A PRE-CONSTRUCTION MEETING WILL BE HELD WITH THE TOWN ENGINEER, CONTRACTOR, OWNER, AND PROJECT ENGINEER TO REVIEW PROCEDURES, IDENTIFY RESPONSIBILITIES, UNLESS STATED OTHERWISE, ALL MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE APPLICABLE STATE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. CLEARING AND GRUBBING- ALL TOPSOIL AND UNSUITABLE MATERIALS SHALL BE REMOVED FROM THE DRIVEWAY, PARKING LOT, AND SIDEWALK LIMITS. THE DRIVEWAY AND PARKING LOT BASE MATERIAL SHALL EXTEND ONE FOOT BEYOND THE EDGE OF PAVING.
3. BASE COURSE- THE BASE COURSE SHALL CONSIST OF TWELVE INCHES OF GRAVEL AND SIX INCHES OF CRUSHED GRAVEL. GRADATION CURVES COMPLYING WITH AASHTO T27 AND T11 SHALL BE PROVIDED FOR THE ENGINEERS REVIEW PRIOR TO CONSTRUCTION.
4. COMPACTION SHALL BE PERFORMED USING VIBRATORY ROLLERS AND WATER IN LIFTS OF NO GREATER THAN TWELVE 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 DETERMINED IN ACCORDANCE WITH AASHTO T99.
5. COMPACTION TESTING SHALL BE PERFORMED FOR EVERY LAYER OF MATERIAL PLACED AND FOR EVERY 1000 SQUARE FEET OF AREA.
6. PAVEMENT SHALL MEET APPLICABLE STATE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION REQUIREMENTS, IN ADDITION TO APPLICABLE TOWN ROAD STANDARDS.
7. PAVEMENT SHALL NOT BE INSTALLED WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT, NOR WHEN THE ROAD BASE TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT. PAVEMENT SHALL NOT FALL BELOW 185 DEGREES FAHRENHEIT PRIOR TO THE COMPLETION OF ROLLING. PAVEMENT SHALL NOT BE INSTALLED WHEN THE SUBGRADE IS FROZEN OR THE GRADES ARE INCORRECT.
8. ALL REMAINING DISTURBED AREAS WITHIN THE RIGHT OF WAY SHALL BE FERTILIZED AND SEEDED IN ACCORDANCE WITH APPLICABLE STATE SPECIFICATIONS.
9. THE SEEDING OF SLOPES AND DITCHES SHALL REQUIRE THE USE OF EROSION CONTROL MATTING.
10. TOWN INSPECTION REQUIREMENTS:
 - A. BASE GRAVEL - INSTALLED AND COMPACTED
 - B. CRUSHED GRAVEL - INSTALLED AND COMPACTED
 - C. PAVEMENT INSTALLATION
 - D. UTILITY INSTALLATION - TOWN MUST BE PRESENT DURING INSTALLATION OF WATER, SEWER, CABLE PIPES, ETC.
 - E. WEEKLY INSPECTIONS OF AS-BUILT DRAWINGS
 - F. FINAL INSPECTION PRIOR TO RELEASE OF SURETY
11. COST OF INSPECTION AND TESTING SHALL BE PAID BY THE APPLICANT.
12. 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:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	2 INCHES	100
	1-1/2 INCHES	90 - 100
	3/4 INCHES	70 - 100
	NO. 4	60 - 100
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
C. 1 1/2" CRUSHED STONE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	1-3/4 INCH	100
	1-1/2 INCHES	90 - 100
	1 INCH	20 - 55
	3/4 INCH	0 - 15
D. GRAVEL SUB-BASE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	NO. 4	20 - 60
	NO. 100	0 - 12
	NO. 200	0 - 6
	NO. 4	0 - 6
E. 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. 100	0 - 12
F. GRANULAR BACKFILL:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	3 INCHES	100
	NO. 4	45 - 75
	NO. 100	0 - 12
	NO. 200	0 - 6

Stamp

Chkd.

Description

Rev. No.

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Client:

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(802) 879-4504

Sheet Title: Site Details

Project Title: The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By: KW/HKW
Checked By: KW
Drawn By: HKW
Scale: NOT TO SCALE
Date: 12/06/16

ISSUED FOR
PERMIT REVIEW
12/06/16

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EV#16414

SEWER NOTES

A-01. BUILDING SEWERS

- A. MATERIALS: THE BUILDING SEWER SHALL BE CONSTRUCTED IN A MANNER WHICH WILL PREVENT LEAKING, BREAKING OR CLOGGING. ACCEPTABLE MATERIALS FOR THE SEWER ARE RUBBER-RING-JOINTED PVC GRAVITY SEWER PIPE SDR35 ASTM D3034.
- B. SIZING AND SLOPE: MINIMUM BUILDING SEWER SIZE IS 4 INCHES (UNLESS SHOWN ON THE PLAN) AND A MINIMUM SLOPE IS 1/4 INCH PER FOOT.
- C. MANHOLES: BUILDING SEWERS DISCHARGING TO A COLLECTION SEWER SHALL BE CONNECTED THROUGH A MANHOLE OR WITH A WYE FITTING SO AS TO DIRECT FLOW AND MINIMIZE IN-LINE TURBULENCE.
- D. CLEANOUTS: CLEANOUTS SHALL BE PROVIDED AT EACH HORIZONTAL CHANGE IN DIRECTION OF THE BUILDING SEWER GREATER THAN 45 DEGREES, NOT GREATER THAN EVERY 100' AND WHERE INDICATED ON THE DESIGN DRAWINGS. BUILDING SEWER CHANGES IN DIRECTION WHICH EXCEED 45 DEGREES SHOULD BE MADE WITH TWO 45 DEGREE ELLS OR LONG SWEEP FITTINGS. MANHOLES ARE ACCEPTABLE IN LIEU OF CLEANOUTS. WHERE BUILDING SEWERS ARE TO BE INSTALLED AT A DEPTH OF LESS THAN 3 FEET UNDER DRIVEWAYS ARE ANTICIPATED, EXTRA HEAVY CAST IRON PIPE SHALL BE USED.
- E. LEAKAGE: BUILDING SEWERS SHALL MEET THE LEAKAGE STANDARDS PRESCRIBED IN THE STATE OF NEW YORK SPECIFICATIONS. SEE "A-02, J" BELOW FOR MORE DETAIL.

A-02. SEWER COLLECTION SYSTEMS:

- A. A SEWER COLLECTION SYSTEM IS THAT SYSTEM OF SEWERS THAT TRANSPORT WASTEWATER FROM BUILDING SEWERS TO THE WASTEWATER TREATMENT/ DISPOSAL SYSTEM.
- B. NO CONNECTIONS OF ROOF DRAINS, AREA DRAINS, FOUNDATION DRAINS, CELLAR DRAINS OR OTHER CLEAN WATER SOURCES OR ANY STORM DRAINS WILL BE ALLOWED TO BUILDING OR COLLECTION SEWERS.
- C. THE SIZE OF COLLECTION SEWERS SHALL BE AS SHOWN ON THESE DRAWINGS.
- D. DEPTH: SEWERS SHALL BE SUFFICIENTLY DEEP TO PREVENT FREEZING. RIGID FOAM INSULATION SHALL BE USED, WHERE INDICATED ON DRAWINGS.
- E. SLOPE: VELOCITY: ALL SEWERS SHALL BE INSTALLED WITH NOT LESS THAN THE SLOPES SHOWN BELOW:

PIPE SIZE (INCHES)	SLOPE (FEET/100 FEET)
6"	0.60
8"	0.40

- F. CHANGES IN PIPE SIZE: WHEN A SMALLER SEWER JOINS A LARGE ONE, THE INVERT OF THE LARGER SEWER SHALL BE LOWERED SUFFICIENTLY TO MAINTAIN THE SAME ENERGY GRADIENT.
- G. MATERIAL: PVC SDR 35, ASTM D3034, WITH PUSH-ON GASKETED JOINTS. GASKETS SHALL CONFORM TO ASTM D3212. SEWER JOINTS SHALL BE CONSTRUCTED TO MINIMIZE INFILTRATION AND TO PREVENT THE ENTRANCE OF ROOTS INTO THE SYSTEM.
- H. TRENCHING: LEDGE, ROCK, BOULDERS AND LARGE STONES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF FOUR INCHES BELOW AND ON EACH SIDE OF ALL PIPES.
- I. BEDDING: SEE TRENCH DETAILS THIS DRAWING FOR MATERIALS. TRENCH BACKFILL SHALL BE OF A SUITABLE NATIVE MATERIAL FREE FROM DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONES, ORGANIC MATTER, OR OTHER UNSTABLE MATERIALS.
- J. LEAKAGE TESTS: UPON COMPLETION OF SEWER MAIN CONSTRUCTION, THE SEWER LINE SHALL BE TESTED IN ACCORDANCE WITH THE STATE OF NEW YORK SPECIFICATIONS.

LEAKAGE TESTS FOR GRAVITY SEWERS

PERFORM A PRESSURIZED AIR TEST ON THE GRAVITY LINE IN ACCORDANCE WITH THE LATEST VERSION OF DESIGN STANDARDS FOR WASTEWATER TREATMENT WORKS ON EACH SECTION OF THE GRAVITY SEWER. THE ENGINEER SHALL BE GIVEN 24 HOURS NOTICE BEFORE THE TEST IS CONDUCTED. TEST MUST BE WITNESSED BY THE ENGINEER.

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

START THE TEST WHEN THE PRESSURE HAS STABILIZED AND IS AT OR ABOVE THE STARTING TEST PRESSURE OF 3.5 PSI ABOVE THE PIPE. IF THE PRESSURE DROPS MORE THAN 1.0 PSI DURING THE TEST TIME, THE LINE IS PRESUMED TO HAVE FAILED THE TEST. IF A 1.0 PSI DROP DOES NOT OCCUR WITHIN THE TEST TIME, THE LINE HAS PASSED THE TEST. THE TEST TIME SHALL BE DERIVED FROM THE FOLLOWING TABLE. IF THE SECTION OF LINE TO BE TESTED INCLUDES MORE THAN ONE PIPE SIZE, CALCULATE THE TEST TIME FOR EACH SIZE AND ADD THE TEST TIMES TO ARRIVE AT THE TOTAL TEST TIME FOR THE SECTION.

PIPE SIZE (INCHES)	T (TIME) (MIN/100 FT.)
3	0.2
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8

- K. INSTALLATION: PIPE SHALL BE LAID WITH BELL ENDS FACING UPGRADE AND LAYING SHALL START AT THE DOWNGRADE END.
- L. WATER LINE SEPARATION
- a. HORIZONTAL SEPARATION: SEWERS SHALL BE LAID FLAT AT LEAST TEN FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER LINE. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. WHERE IMPOSSIBLE OR IMPRACTICABLE, DUE TO LEDGE, BOULDERS OR OTHER UNUSUAL CONDITIONS, TO MAINTAIN THE TEN FOOT SEWER/WATER PIPE HORIZONTAL SEPARATION BETWEEN SEWER AND WATER LINES, THE WATER LINE MAY BE IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF IN THE SEWER TRENCH PROVIDED THAT THE BOTTOM OF THE WATER LINE IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER. WHEREVER IMPOSSIBLE OR IMPRACTICAL TO MAINTAIN THE 18 INCH VERTICAL SEPARATION, THE SEWER LINE SHALL BE CONSTRUCTED TO NORMAL WATER LINE STANDARDS AND PRESSURE TESTED TO 50 PSI FOR 15 MINUTE PRIOR TO BACKFILLING. NO LEAKAGE SHALL BE ALLOWED FOR THIS TEST.

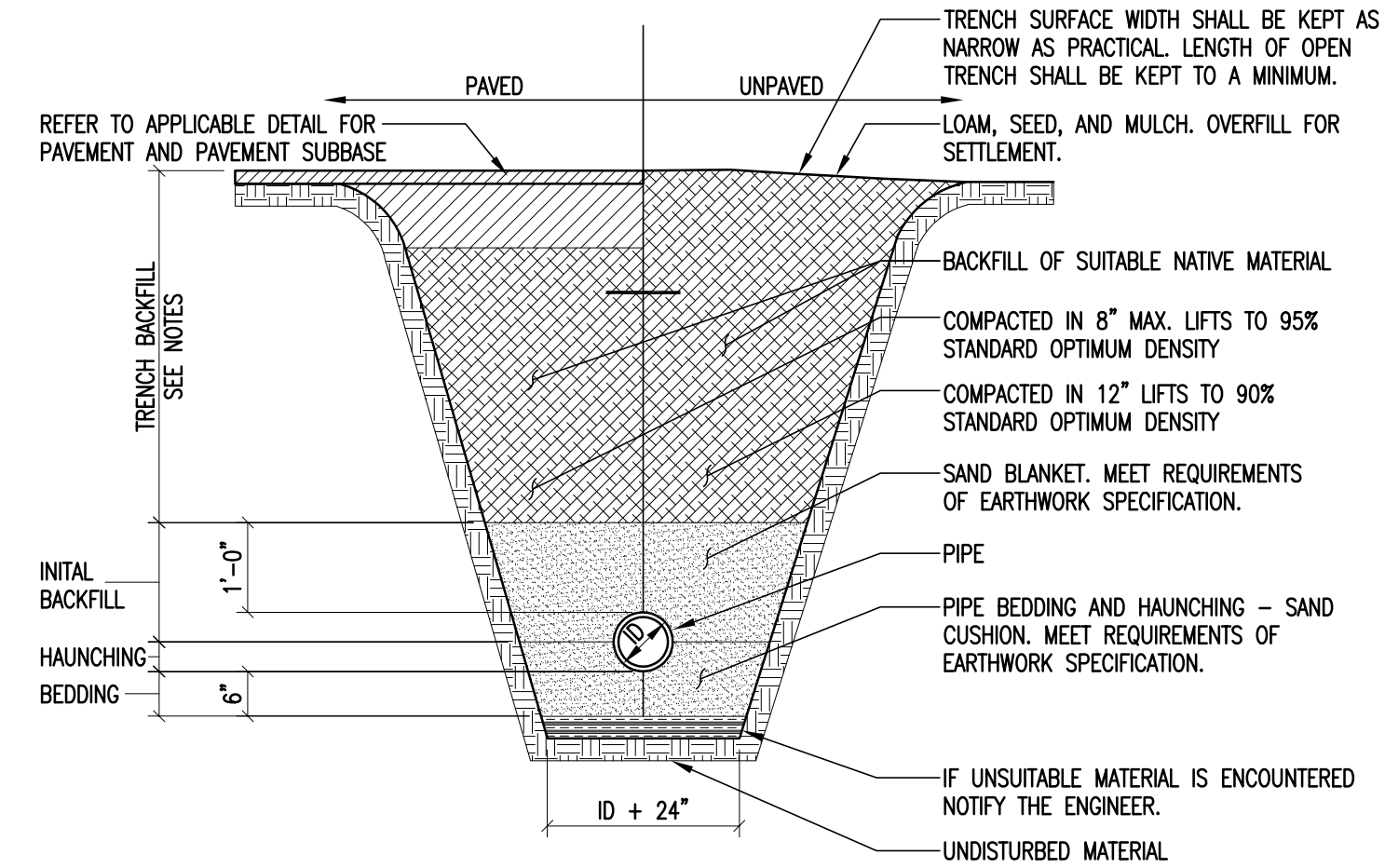
- b. CROSSINGS: SEWERS CROSSING WATER MAINS SHALL BE LAID BENEATH THE WATER MAIN WITH AT LEAST 18 INCHES VERTICAL CLEARANCE BETWEEN THE OUTSIDE OF THE SEWER AND THE OUTSIDE OF THE WATER MAIN. WHEN IT IS IMPOSSIBLE TO MAINTAIN THE 18 INCH VERTICAL SEPARATION:
1. THE CROSSING SHALL BE ARRANGED SO THAT ONE FULL LENGTH OF SEWER IS CENTERED ABOVE OR BELOW THE WATER LINE WITH SEWER JOINTS AS FAR AWAY AS POSSIBLE FROM WATER JOINTS;
 2. THE SEWER PIPE MUST BE CONSTRUCTED TO WATER MAIN STANDARDS FOR A MINIMUM DISTANCE OF 20 FEET EITHER SIDE OF THE CROSSING OR A TOTAL OF THREE PIPE LENGTHS, WHICHEVER IS GREATER;
 3. THE SECTION CONSTRUCTED TO WATER MAIN STANDARDS MUST BE PRESSURE TESTED TO MAINTAIN 50 PSI FOR 15 MINUTES WITHOUT LEAKAGE PRIOR TO BACKFILLING BEYOND ONE FOOT ABOVE THE PIPE TO ASSURE WATER TIGHTNESS;
 4. WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO PREVENT DAMAGE TO THE WATER MAIN.

A-03. MANHOLES

- A. DIAMETER: THE MINIMUM DIAMETER OF MANHOLES SHALL BE 48 INCHES; LARGE DIAMETERS ARE PREFERRED FOR CONNECTION TO LARGE DRAINAGE SEWERS. A MINIMUM ACCESS DIAMETER OF 24 INCHES SHALL BE PROVIDED.
- B. FLOW CHANNEL: FLOW CHANNELS SHALL BE PROVIDED IN THE BASE OF ALL MANHOLES AND THE FLOW CHANNEL THROUGH MANHOLES SHOULD BE MADE TO CONFORM IN SHAPE AND SLOPE TO THAT OF THE SEWERS.
- C. MANHOLES SHALL BE OF THE PRE-CAST CONCRETE OR FOUR-IN PLACE CONCRETE TYPE. MANHOLES SHALL BE WATERPROOFED ON THE EXTERIOR.
- D. INLET AND OUTLET PIPES SHALL BE JOINED TO THE MANHOLE WITH A RUBBER-GASKETED FLEXIBLE WATERTIGHT CONNECTION THAT ALLOWS DIFFERENTIAL SETTLEMENT OF THE PIPE AND MANHOLE WALL TO TAKE PLACE.
- E. ALL MANHOLES SHALL BE TESTED FOR LEAKAGE. LEAKAGE TESTING OF GRAVITY SEWERS UTILIZING THE WATER TESTING PROCEDURES TAKES INTO ACCOUNT THE LEAKAGE FROM ONE MANHOLE IN THE TEST SECTION. OTHERWISE, MANHOLES SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH THE FOLLOWING PROCEDURE:

AFTER THE MANHOLE HAS BEEN ASSEMBLED IN PLACE, ALL LIFTING HOLES AND EXTERIOR JOINTS SHALL BE FILLED WITH AND POINTED WITH AN APPROVED NON-SHRINKING MORTAR. ALL PIPES AND OTHER OPENINGS INTO THE MANHOLE SHALL BE SUITABLY PLUGGED AND THE PLUGS PLACED TO PREVENT BLOWOUT.

EACH MANHOLE SHALL BE CHECKED FOR INFILTRATION BY FILLING WITH WATER TO THE TOP OF THE CONE SECTION. A STABILIZATION PERIOD OF ONE HOUR SHALL BE PROVIDED TO ALLOW FOR ABSORPTION. AT THE END OF THIS PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE, IF NECESSARY, AND THE MEASURING TIME OF AT LEAST SIX HOURS BEGUN. AT THE END OF THE TEST PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE MEASURING THE VOLUME OF WATER ADDED. THIS AMOUNT SHALL BE CONVERTED TO A 24 HOUR RATE AND THE LEAKAGE DETERMINED ON THE BASIS OF DEPTH. THE LEAKAGE FOR EACH MANHOLE SHALL NOT EXCEED ONE GALLON PER VERTICAL FOOT FOR A 24 HOUR PERIOD FOR EXFILTRATION AND THERE SHALL BE NO VISIBLE INFILTRATION.



GENERAL TRENCH NOTES:

1. UNLESS OTHERWISE NOTED, ASSUME CLASS "C" SOILS. PERFORM ALL EXCAVATIONS TO OSHA REQUIREMENTS.
2. BEDDING TO PROVIDE A FIRM, STABLE, CONTINUOUS AND UNIFORM SUPPORT FOR FULL LENGTH OF PIPE.
3. NO MECHANICAL TAMPERS SHALL BE USED DIRECTLY OVER PIPE TO ENSURE PIPE IS NOT DAMAGED.
4. BACKFILL SHALL BE OF A SUITABLE MATERIAL, REMOVED FROM EXCAVATION EXCEPT WHERE OTHER MATERIAL IS SPECIFIED. DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONES, ORGANIC MATTER, OR OTHER UNSTABLE MATERIALS SHALL NOT BE USED FOR BACKFILL WITHIN TWO FEET OF THE TOP OF THE PIPE.
5. LEDGE, ROCK, BOULDERS AND LARGE STONES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF FOUR INCHES BELOW AND ON EACH SIDE OF ALL PIPES.
6. SUITABLE NATIVE SOIL MAY BE USED UNDER PAVED AREAS UPON APPROVAL OF ENGINEER.

SEWER TRENCH NOTES:

1. FOR BUILDING SEWERS THE MINIMUM DEPTH TO THE TOP OF THE PIPE SHALL BE 4'-0". WHERE BUILDING SEWERS ARE TO BE INSTALLED AT A DEPTH LESS THAN 3'-0" UNDER DRIVEWAYS, DUCTILE IRON CLS2 OR OTHER HIGH STRENGTH PIPE SHALL BE USED. OTHERWISE, REFER TO INSULATION OVER SHALLOW SEWER/STORM LINE DETAIL.
2. FOR SEWER COLLECTION SYSTEMS THE MINIMUM DEPTH TO THE TOP OF THE PIPE SHALL BE 5'-0". THIS DEPTH SHALL BE INCREASED TO 6'-0" IN AREAS TO BE FLOWED DURING THE WINTER MONTHS. OTHERWISE, REFER TO INSULATION OVER SHALLOW SEWER/STORM LINE DETAIL.

STORM TRENCH NOTES:

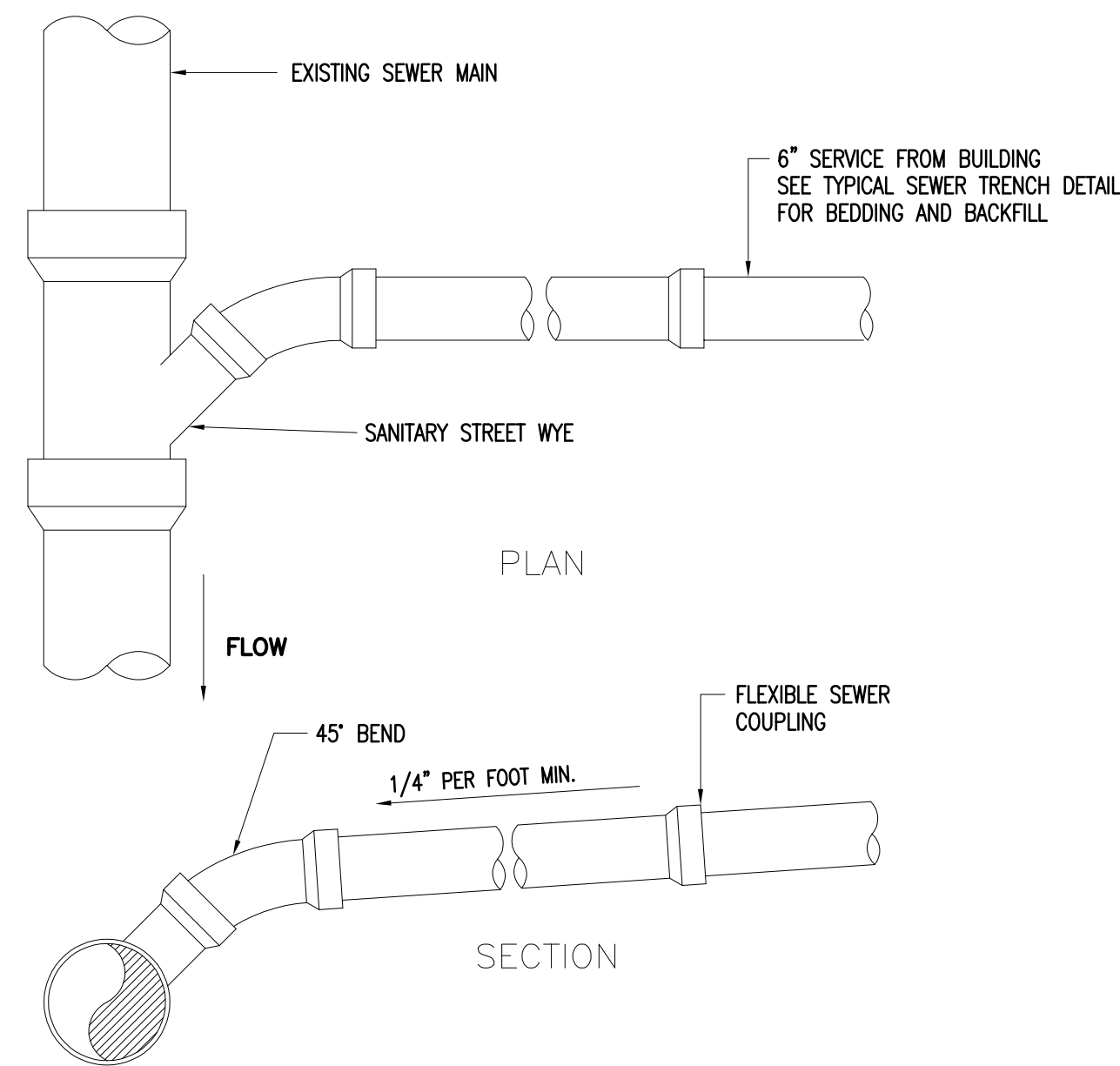
1. PROVIDE 6" OF COVER OVER DRAIN PIPE IN PAVED AREAS AND 5' OF COVER OVER PIPE IN UNPAVED AREAS. OTHERWISE REFER TO INSULATION OVER SHALLOW SEWER/STORM LINE DETAIL.
2. WHEN APPLICABLE, INSTALL PIPE WITH BELL ENDS DOWN SLOPE. PREVENT SEDIMENT FROM ENTERING NEW STORM DRAIN SYSTEM DURING CONSTRUCTION.

WATERLINE TRENCH NOTES:

1. MINIMUM DEPTH TO THE TOP OF THE WATERLINE SHALL BE 5'-6". OTHERWISE, REFER TO INSULATION OVER SHALLOW WATER LINE DETAIL.
2. INSTALL WATER LINE IN ACCORDANCE WITH LATEST AWWA STANDARDS.

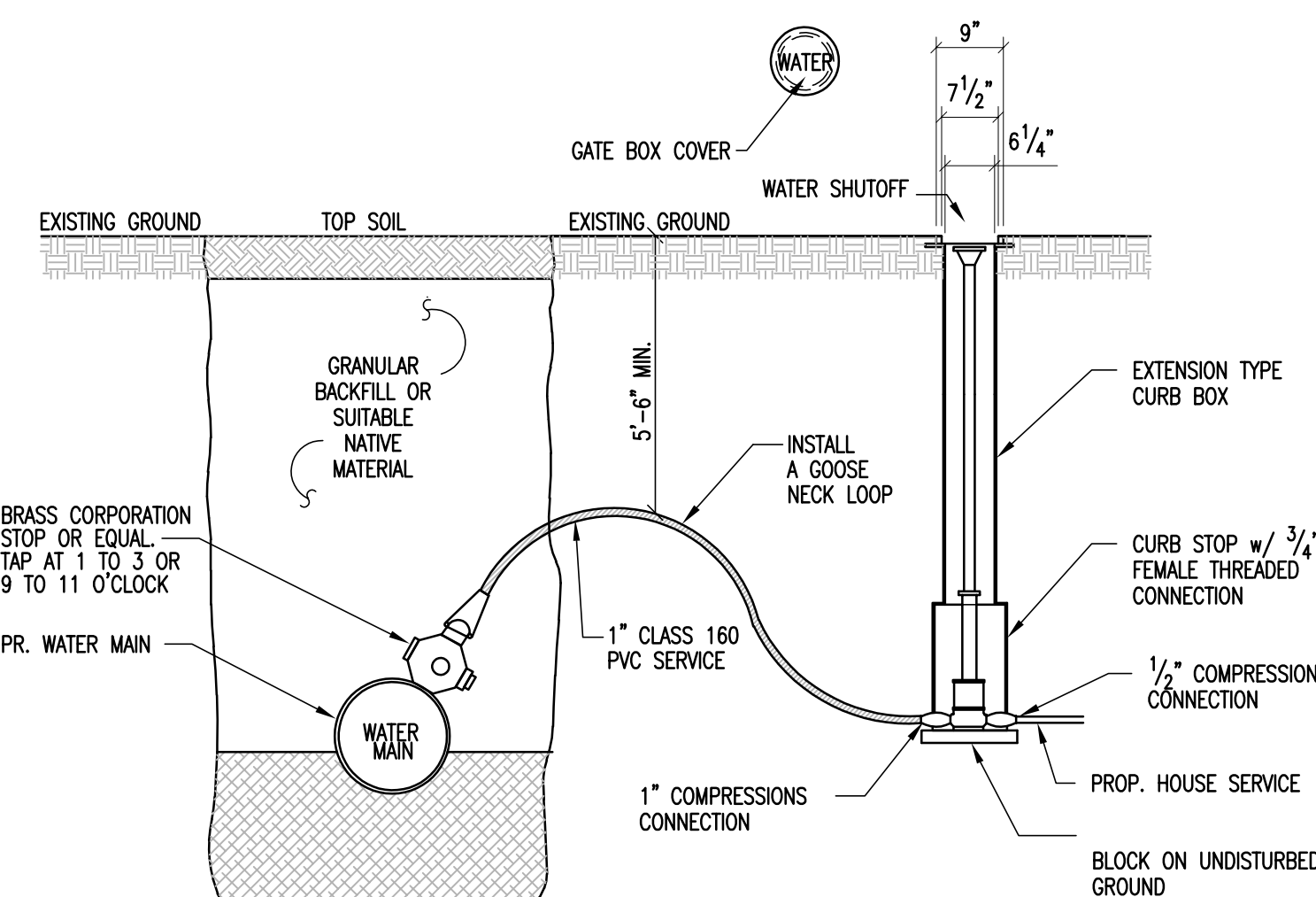
STORM/SEWER/WATER TRENCH DETAIL

NOT TO SCALE 6



SEWER SERVICE CONNECTION

NOT TO SCALE 3

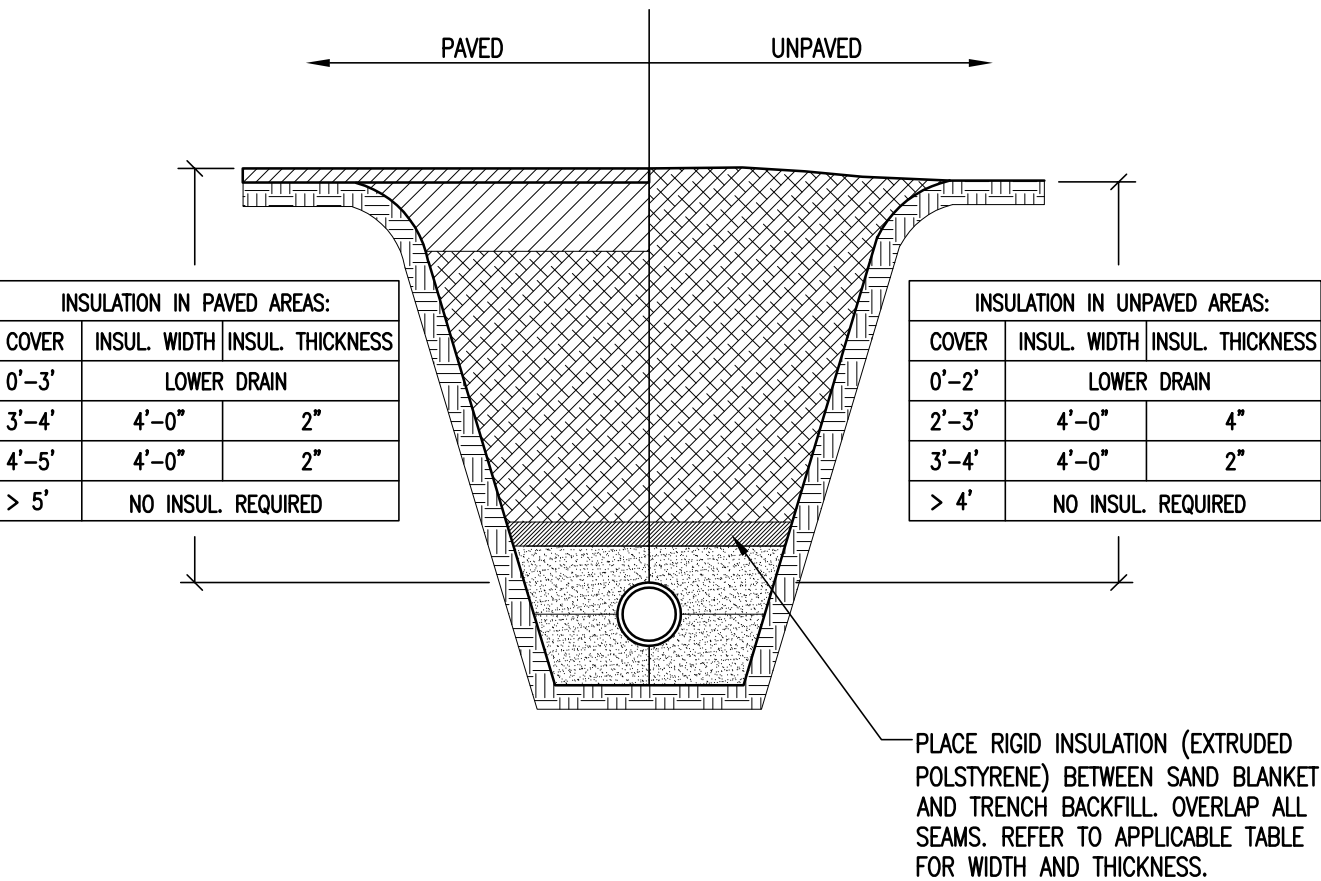


SERVICE CONNECTION NOTES:

1. TEFLON THREADED SEALANT TAPE WILL BE USED ON ALL CORPORATION STOPS PRIOR TO INSTALLATION.
A. SPIRAL WRAP COMPLETELY COVERING THE THREAD AREA WITH TWO WRAPS.
2. PIPE DOPE OR OTHER LIQUID THREAD SEALANTS ARE NOT ACCEPTABLE.
3. LEAVE UP TO THREE THREADS SHOWING OUTSIDE OF PIPE. A TORQUE OF 35 POUNDS IS RECOMMENDED.

WATER SERVICE CONNECTION DETAIL

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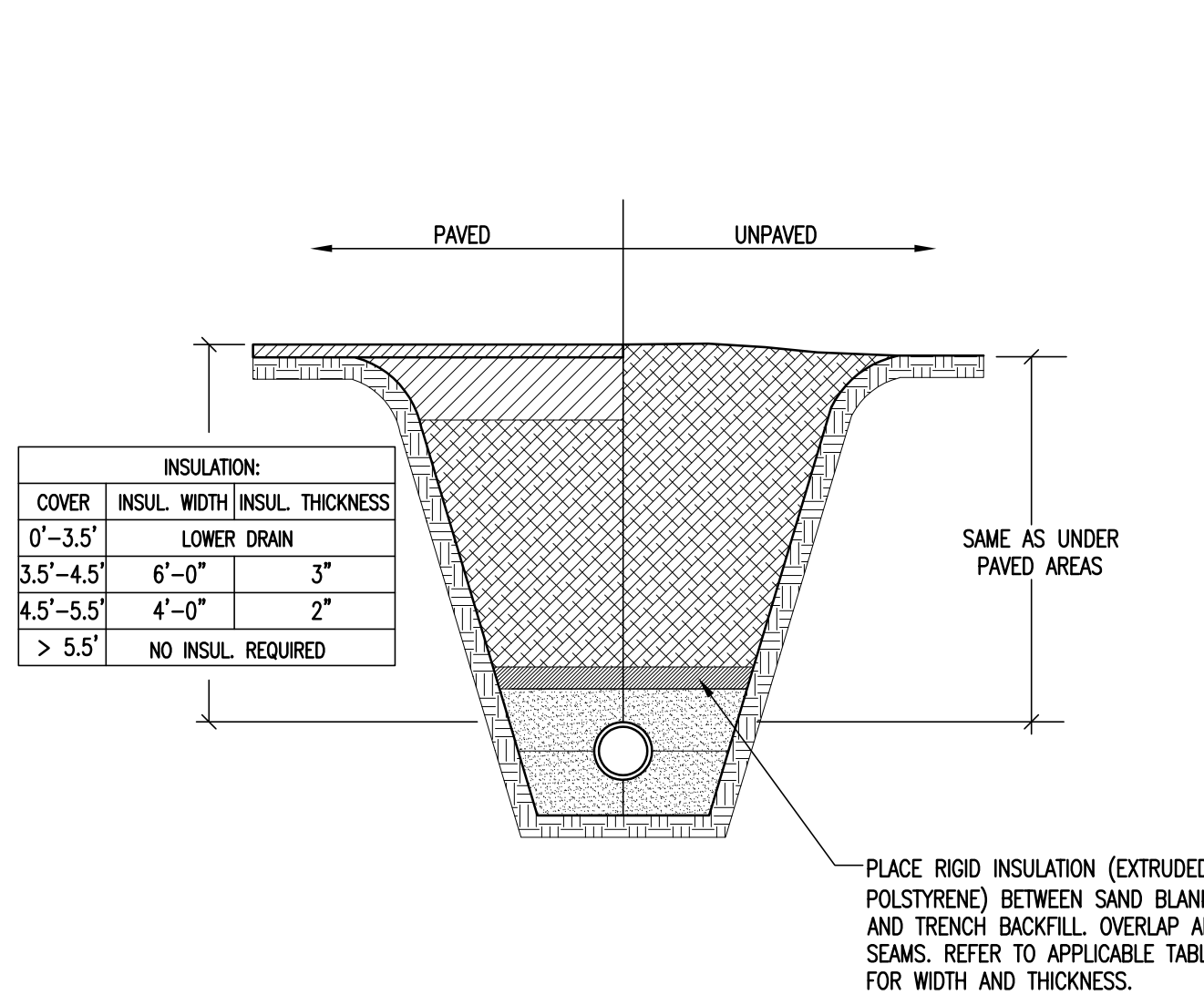


TRENCH NOTES:

1. REFER TO TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION.

INSULATION OVER SHALLOW SEWER LINE DETAIL

NOT TO SCALE 7



TRENCH NOTES:

1. REFER TO TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION.

WATER NOTES

WATER MAINS

1. PERFORM A HYDROSTATIC AND LEAKAGE TEST ACCORDING TO AWWA C600(LATEST REVISION) ON EACH PIPE LINE.
2. THE ENGINEER SHALL BE GIVEN AT LEAST 48 HOURS NOTICE BEFORE THE TEST IS CONDUCTED. TEST MUST BE WITNESSED BY THE ENGINEER.
3. SPECIFIED TEST PRESSURE IS A MINIMUM OF 200 PSI OR 1.5X THE WORKING PRESSURE, WHICHEVER IS GREATER, AND PRESSURE DURING TEST SHALL NOT VARY BY MORE THAN 5 PSI. SEE THE CURRENT EDITION OF AWWA C600 FOR ALLOWABLE LEAKAGE.

EXISTING UTILITIES

1. LOCATION OF UTILITY INSTALLATIONS AND UNDERGROUND STRUCTURES ARE SHOWN AS APPROXIMATE ON THE CONTRACT DOCUMENTS. SOME UTILITIES MAY NOT BE SHOWN.
2. ALL UTILITIES SHALL BE LOCATED BY THE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
3. EXISTING UTILITIES SHALL BE PROTECTED AND SUPPORTED DURING CONSTRUCTION.
4. ALL WATER, GAS, CABLE, TELEPHONE, ELECTRIC, SEWER, AND OTHER UTILITIES FOUND TO INTERFERE WITH THE PROPOSED CONSTRUCTION SHALL BE RELOCATED IN A MANNER ACCEPTABLE TO THE ENGINEER.

PIPE BEDDING

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

PIPE TRENCH BACKFILL

1. MEET EARTHWORK SPECIFICATIONS FOR PLACEMENT AND COMPACTION.

DUCTILE IRON PIPE (WATER)

1. D.I. PIPE CONFORM TO AWWA/ANSI C151.
2. LININGS AND LINING REPAIR TO AWWA/ANSI C104.
3. JOINTS CONFORM TO AWWA/ANSI C 111 AND C115.
4. FITTINGS CONFORM TO AWWA/ANSI C110, C153, C105.
5. KEEP INSIDE OF PIPE CLEAN AND FREE OF DEBRIS.
6. REJECT ANY PIPE WHICH IS DROPPED DURING HANDLING.
7. MECHANICAL JOINT GLANDS SHALL BE "MEGA-LUG" RETAINER GLANDS.
8. DUCTILE IRON FITTINGS: ANSI A21.10, 350 PSI PRESSURE RATING.
9. JOINTS: MECHANICAL, PUSH-ON, AND FLANGED:
A. RUBBER GASKET JOINT, ANSI A21.11 GASKETS:
A. MECHANICAL AND PUSH-ON JOINTS: ANSI A21.11
B. FLANGED JOINT: 3/8" THICK RING OR FULL FACED RUBBER, ANSI A21.15.
10. BOLTS/NUTS
A. MECHANICAL JOINT: ANSI A21.11
B. FLANGED JOINT: ANSI A21.15
11. LININGS:
A. INTERIOR - CEMENT LINED, DOUBLE THICKNESS BITUMINOUS SEAL.
B. EXTERIOR-BITUMINOUS COATING APPROX. 1 MIL THICK, ANSI A21.51, ANSI A21.15, AND ANSI A21.10.
C. FLANGE MACHINED FACE COATING: ANSI A21.15.

LAYING PIPE

- A. PIPE SHALL BE LAID WITH BELL ENDS FACING IN THE DIRECTION OF LAYING.
- B. WHERE PIPE IS LAID ON A SLOPE OF 5% OR MORE, THE LAYING SHALL START AT THE LOW END AND PROCEED UPHILL, WITH THE BELL ENDS UPGRADE.
- C. A WATERTIGHT PLUG SHALL BE PLACED IN THE OPEN ENDS OF INSTALLED PIPE WHEN PIPE LAYING IS NOT IN PROGRESS.
- D. MAX. PERMISSIBLE DEFLECTION IS 75% OF AWWA SPEC. C600.

CHLORINATION OF DOMESTIC WATER LINES

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST 48 HOURS IN ADVANCE OF BEGINNING ANY DISINFECTION OF WATER MAINS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR BACTERIOLOGICAL TESTING AS REQUIRED BY THIS SPECIFICATION AND REFERENCE STANDARDS MENTIONED.
3. DISINFECT ALL NEW PIPELINE SYSTEMS IN ACCORDANCE WITH AWWA C651, INCLUDING:
A. METHOD OF CHLORINE APPLICATION. USE CONTINUOUS FEED METHOD OR SLUG METHOD (TABLET METHOD IS NOT ACCEPTABLE).
B. FORM OF CHLORINE UTILIZED.
C. FINAL FLUSHING.
D. BACTERIOLOGICAL TESTING.
E. REPETITION OF PROCEDURE.

GATE VALVES

1. RESILIENT SEAT GATE VALVES BY KENNEDY "KEN-SEAL" OR EQUAL.
2. IRON BODY GATE VALVES TO MEET AWWA C-509-87.
3. STEM CONSTRUCTION: NON-RISING.
4. STEM SEALS: DOUBLE O-RING.
5. GATE: CAST IRON RESILIENT WEDGE WITH SYNTHETIC ELASTOMER COATING, AND SHALL BE EPOXY COATED (FUSION BONDED) INSIDE AND OUT.
6. BONNET HARDWARE SHALL MEET ASTM A307, CADMIUM PLATED.
7. OUTLET CONNECTION: STANDARD MECHANICAL JOINT
8. OPERATION: OPEN COUNTERCLOCKWISE.
9. TAPPING SLEEVES AND VALVES
10. TAPPING VALVES TO MEET ANSI/AWWA C509-87, STANDARD FOR RESILIENT SEATED GATE VALVES.
11. VALVES SHALL HAVE A MINIMUM WORKING PRESSURE OF 150 PSI.
12. VALVES SHALL OPEN COUNTERCLOCKWISE.
13. INLET FLANGES SHALL BE CLASS 125, ANSI B16.1, OR ANSI/AWWA C110/A21.10.
14. OUTLET CONNECTION: STANDARDIZED MECHANICAL JOINT.
15. STEM SEALS: O RING.
16. STEM CONSTRUCTION: NON-RISING.
17. SEATING: PARALLEL SEAT
18. END CONNECTIONS: MECHANICAL ON RUN, FLANGED ON BRANCH.
19. BURIED TAPPING VALVES SHALL BE PROVIDED WITH A 2 INCH SQUARE WRENCH NUT AND CAST IRON VALVE BOX. IF DEPTH FROM GRADE TO TOP OF VALVE OPERATING NUT IS GREATER THAN 6'-0" , A VALVE STEM RISER MADE OF HIGH STRENGTH STEEL SHALL BE PROVIDED. DEPTH FROM VALVE STEM RISER NUT TO GRADE WILL BE 4 TO 6 FEET.

TAPPING SLEEVES

1. AWWA C509, LATEST REVISION.
2. AWWA C207, CLASS D, MAX. WORKING PRESSURE OF 150 PSI.
3. SLEEVES: SPLIT SLEEVES OF CAST IRON OR DUCTILE IRON.
4. MECHANICAL JOINT ENDS WITH END AND GASKET SEALS.
5. INLET FLANGES SHALL BE CLASS 125, ANSI B16.1, OR ANSI/AWWA C110/A21.10.
6. BOLTS AND NUTS, MECHANICAL JOINTS: HIGH STRENGTH CAST IRON OR HIGH STRENGTH LOW ALLOY STEEL, ANSI/AWWA C111/A21.11-90.
7. BOLTS AND NUTS, FLANGED JOINTS: HIGH STRENGTH, LOW CARBON STEEL CONFORMING TO ANSI/AWWA C110/A21.10-87, APPENDIX C.
8. COAT ALL NUTS AND BOLTS WITH A RUST RESISTANT LUBRICANT.
9. 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.
10. VALVE BOXES
11. ACCEPTABLE MANUFACTURER'S: MUELLER, CLOW, OR EQUAL.
12. CLOW F-2452 SLIDING TYPE, TWO PIECE, OR EQUAL.
13. 5 1/2 INCH SHAFT.
14. SIZE 664-A (40-60 INCH OVERALL LENGTH).
15. CAST IRON.
16. CLOW F-2490 LIDS OR EQUAL.
17. THE WORD "WATER" TO BE CAST INTO TOP OF COVERS, AND ARROW SHOWING DIRECTION OF OPENING.

CONCRETE

1. CONCRETE SHALL HAVE:
A. MIN. COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
B. AIR ENTRAINMENT OF 4% TO 6% BY VOLUME.
C. WATER CEMENT RATIO OF 0.49 LBS. WATER/CEMENT.
D. SLUMP OF 2 TO 4 INCHES.
2. CONCRETE SHALL NOT BE PLACED WHEN AMBIENT TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT OR MORE THAN 90 DEGREES FAHRENHEIT.
3. CONCRETE SHALL NOT BE DROPPED MORE THAN SIX FEET INSIDE A FORM.
4. MAINTAIN TEMPERATURE OF CONCRETE SURFACE AT MINIMUM 50 DEGREES FAHRENHEIT FOR 72 HOURS AFTER PLACING CONCRETE. PREHEAT ALL ENCLOSURES FOR A MINIMUM OF 2 HOURS TO PROVIDE A MIN. SURFACE TEMPERATURE OF 45 DEGREES FAHRENHEIT. ALLOW TO SET AND CURE ALL THRUST BLOCKS, CONCRETE SUPPORTS, AND ANCHORS A MINIMUM OF 24 HOURS BEFORE BACKFILLING.
5. COMPLETELY CURE AND SET CONCRETE BEFORE ANY HYDROSTATIC OR LEAKAGE TESTING OF PIPELINE SYSTEMS.
6. NONSHRINK GROUT SHALL BE HALCO TRADEMARK, AS MANUFACTURED BY LEHN & FINK INDUSTRIAL PRODUCTS.
7. DO NOT PLACE ANY MORTAR OR GROUT WHEN AMBIENT TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT.
8. MORTAR FOR MANHOLES SHALL CONSIST OF THE FOLLOWING:
A. CEMENT-TYPE II, ASTM C150.
B. HYDRATED LIME-TYPE II, ASTM C207.
C. SAND- ASTM C 33, FINE AGGREGATES FOR CONCRETE.
D. WATER-CLEAN, SUITABLE FOR DRINKING.

GENERAL

1. BEFORE ANY WATER LINE WORK IS COMMENCED BY THE CONTRACTOR, HE SHALL NOTIFY THE WATER
2. "AS BUILT" DRAWINGS SHALL BE PREPARED BY THE CONTRACTOR AT THE TIME OF COMPLETION OF THE SYSTEM.

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12/06/16

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Description

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Unsworth Properties, LLC
26 Railroad Avenue
East (602) 879-4504

Sheet Title:

Water & Sewer Details

Project Title:

The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By:

KW/HKW

Checked By:

KW

Drawn By:

HKW

Scale:

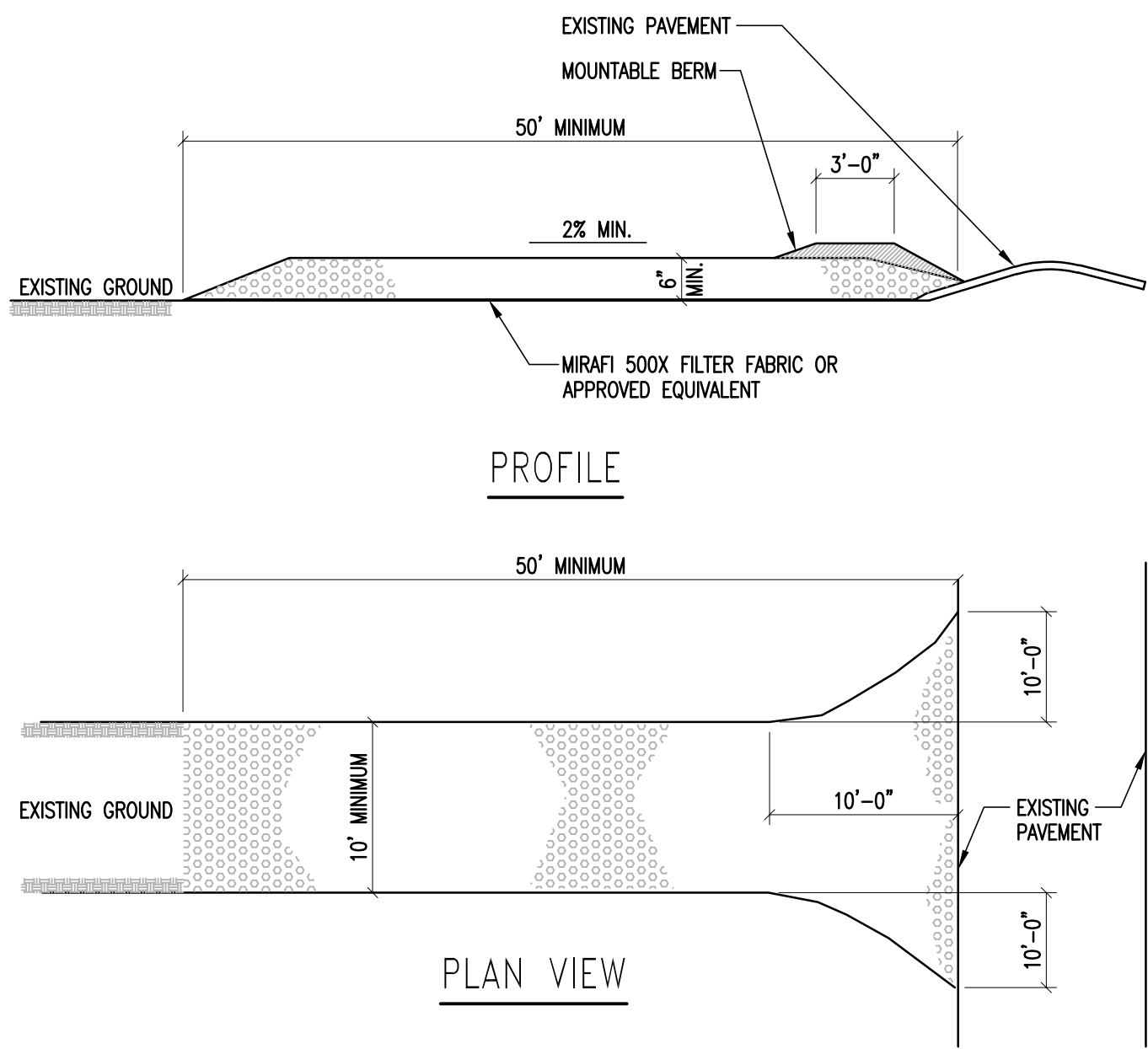
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Date:

12/06/16

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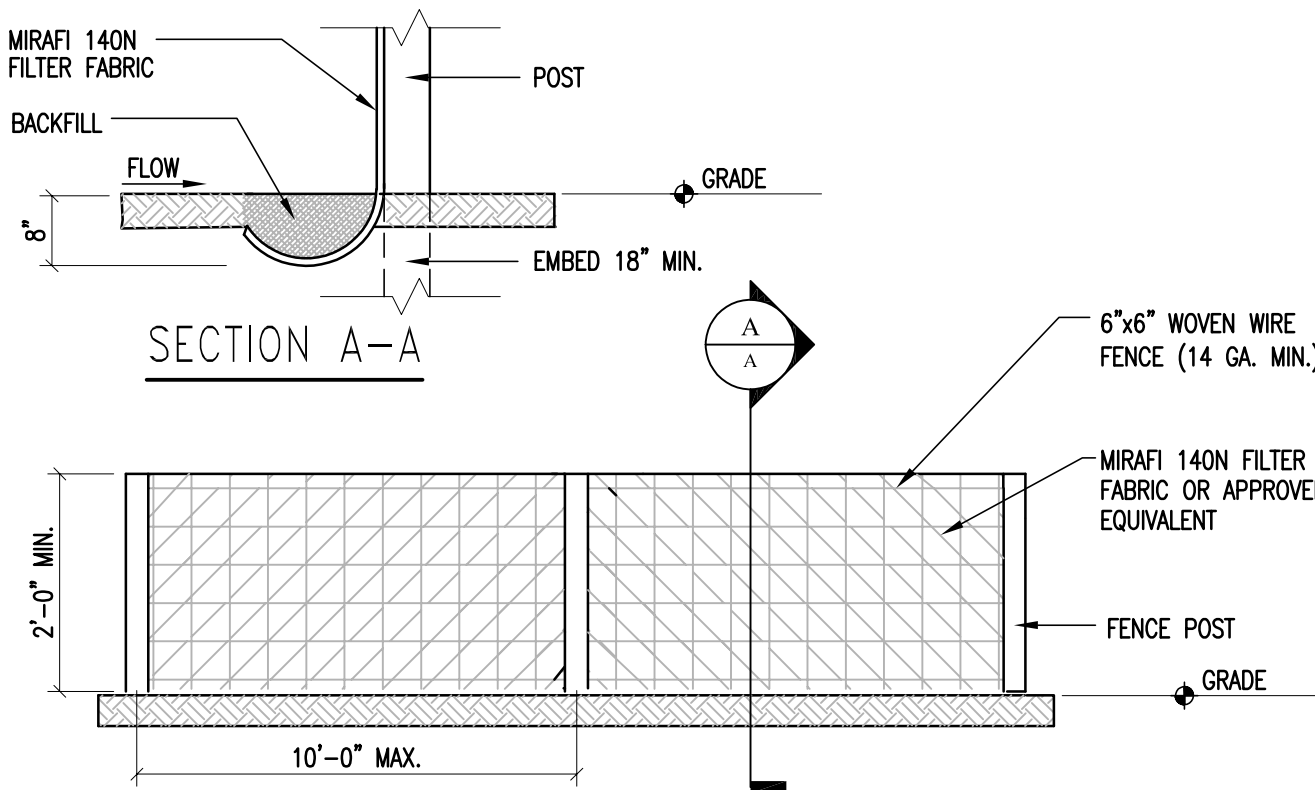


STABILIZED CONSTRUCTION ENTRANCE NOTES:

1. STONE SIZE: USE TYPE 1 STONE-SITE/EARTHWORK SPECIFICATIONS.
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.

STABILIZED CONSTRUCTION ENTRANCE

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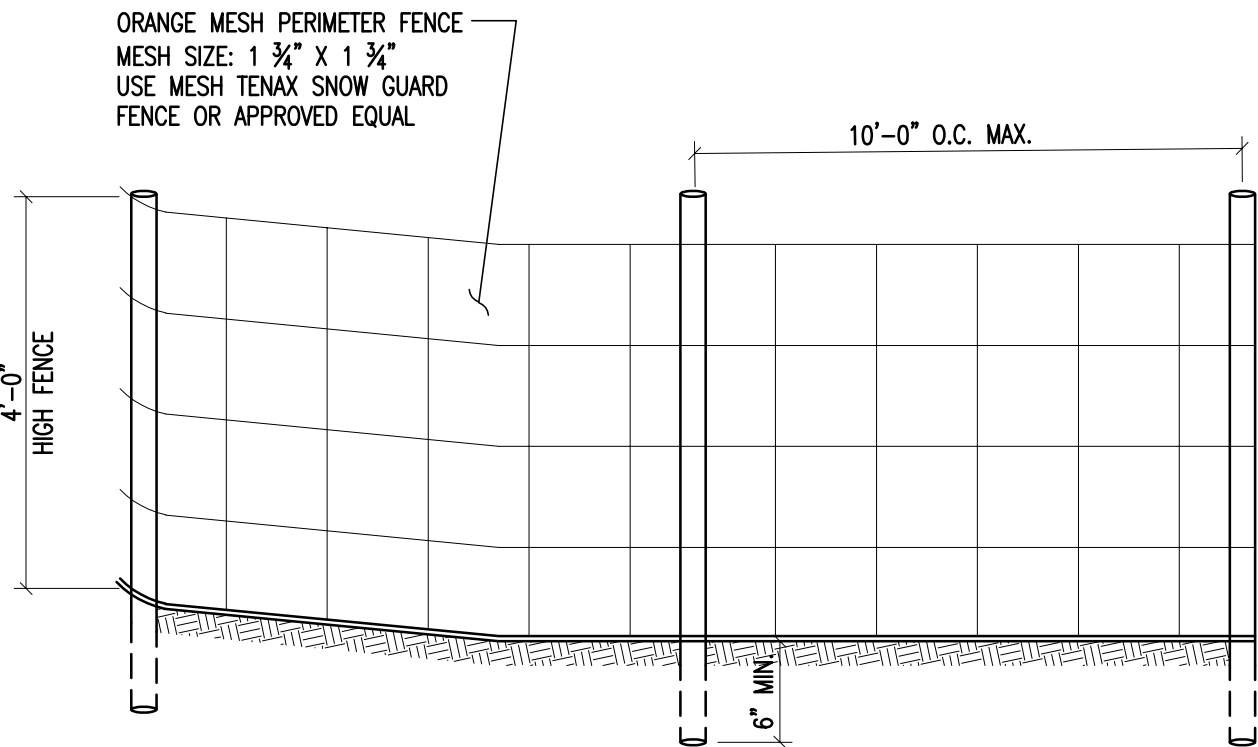


SILT FENCE NOTES:

1. SILT FENCE SHALL BE PRE-FABRICATED EROSION CONTROL FENCE BY MIRAFI OR APPROVED EQUIVALENT, 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.

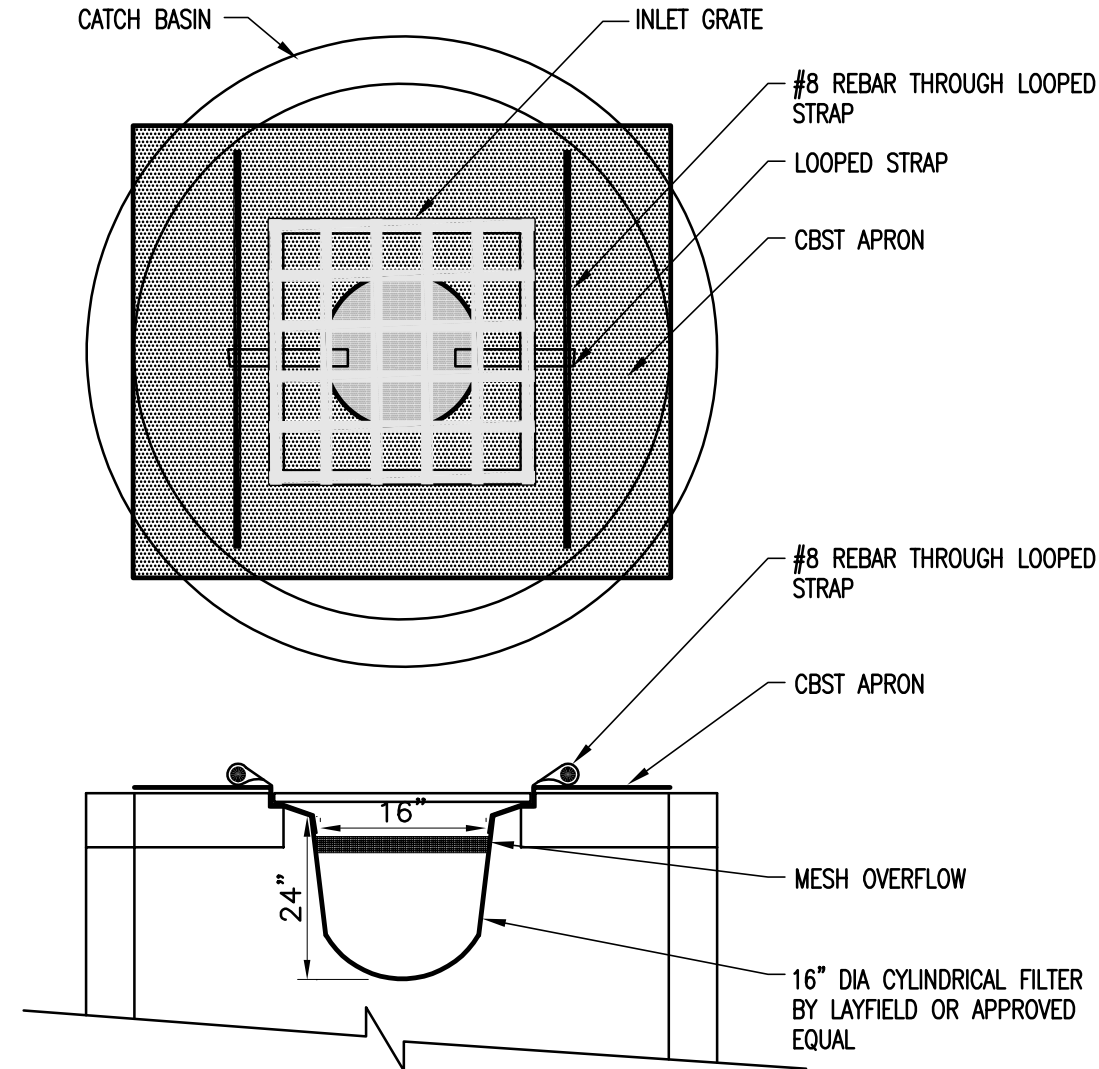
SILT FENCE DETAIL

NOT TO SCALE



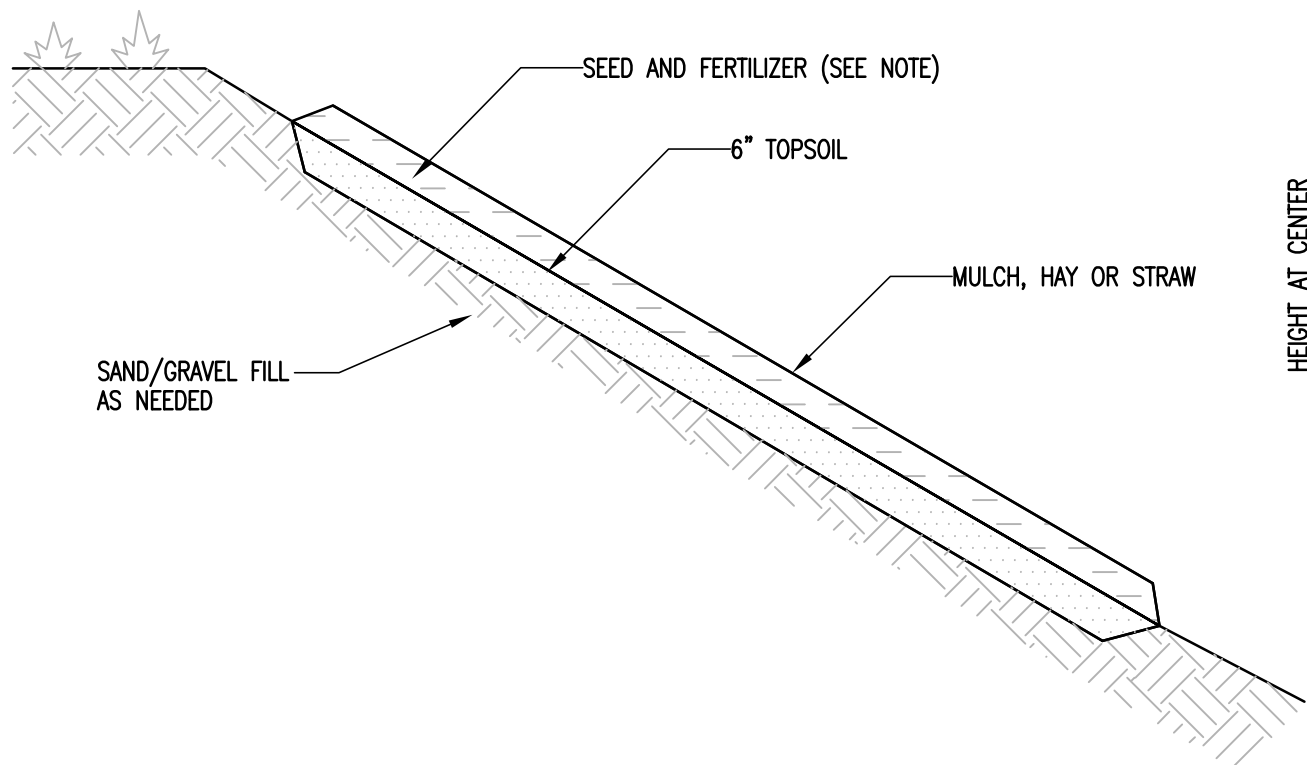
ORANGE CONSTRUCTION FENCE DETAIL

NOT TO SCALE



FABRIC INLET PROTECTION

SCALE: NONE



SEED AND MULCH NOTES:

1. MULCH: HAY OR STRAW MAY BE UTILIZED AND SHALL BE APPLIED AT A RATE OF 2 TONS PER ACRE.
2. SEED: SHALL BE OF THE FOLLOWING MIXTURE:
 - KENTUCKY BLUE GRASS -----20 POUNDS / ACRE
 - CREeping RED FESCUE -----20 POUNDS / ACRE
 - RYE GRASS -----5 POUNDS / ACRE
3. COVER SEED WITH 1/4 INCH SOIL UNLESS A HYDROSEEDER IS USED.
4. MULCH ANCHORING: SHALL BE ACCOMPLISHED BY DEGRADABLE MULCH NETTING. USE WHEN SLOPES ARE GREATER THAN 10%.
5. TOPSOIL AND MULCHING NOT TO BE APPLIED IN AREAS OF TRAVEL WAYS.
6. SEEDING AND MULCHING OF DISTURBED AREAS SHALL TAKE PLACE WITHIN 48 HOURS OF FINAL GRADING.

SEEDED AND MULCHED AREAS DETAIL

NOT TO SCALE

URBAN MIX GRASS SEED-- FOR USE IN GRASSED LAWN AREAS AROUND BUILDING AND PARKING		
% BY WEIGHT	LBS. LIVE SEED BY ACRE	TYPE OF SEED
37.5	45.0	CREeping RED FESCUE
31.25	37.5	KENTUCKY BLUEGRASS
31.25	37.5	WINTER HARDY, PERENNIAL RYE
100	120.0 # LIVE SEED/ ACRE	
CONSERVATION MIX GRASS SEED-- FOR USE IN ALL OTHER AREAS		
% BY WEIGHT	LBS. LIVE SEED PER ACRE	TYPE OF SEED
35	77.0	CREeping RED FESCUE
20	44.0	KENTUCKY BLUE GRASS
15	33.0	CUTTER PERENNIAL RYE GRASS
15	33.0	ANNUAL RYE GRASS
10	22.0	TALL FESCUE
5	11.0	WHITE CLOVER
100	220.0 # LIVE SEED/ACRE	

FERTILIZER- 10 LBS. PER 1000S.F.
SPRING SEEDING
FALL SEEDING

LIME- 90 LBS. PER 1000S.F.
DOLOMITIC GROUND LIMESTONE
NOT LESS THAN 85% OF THE TOTAL CARBONATE

TOP SOIL
6" MINIMUM APPROVED TOPSOIL

STRAW MULCH- 2 BALES PER 1000S.F.
APPLY BINDER OR NETTING AS NEEDED

SEED SPECIFICATION

NOT TO SCALE

EROSION CONTROL NOTES

1. THE "ON-SITE EROSION CONTROL PLAN COORDINATOR" SHALL BE PRESENT ON-SITE FROM DAY-TO-DAY, AND SHALL BE RESPONSIBLE FOR ENSURING THAT THE EROSION CONTROL MEASURES REQUIRED BY THE EROSION CONTROL PLAN, DETAILS AND NOTES, ARE PROPERLY INSTALLED AND MAINTAINED. THE ON-SITE EROSION CONTROL PLAN COORDINATOR SHALL KEEP A WRITTEN RECORD OF INSPECTIONS AND MAINTENANCE OF EROSION CONTROL FEATURES. A COPY OF THESE PLANS AND INSPECTION/MAINTENANCE RECORDS SHALL BE KEPT ON-SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE OWNER AT LEAST 24-HOURS PRIOR TO ANY EARTH DISTURBING ACTIVITIES AND SHALL POST THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN NOTICE IN FULL VIEW AT ALL TIMES DURING EARTH DISTURBANCE.
3. DISTURBANCE LIMITS ARE TO BE MARKED, AND THE FOLLOWING MANAGEMENT PRACTICES INSTALLED, PRIOR TO BEGINNING EARTHWORK IN ANY GIVEN AREA: SILT FENCE, CONSTRUCTION ENTRANCE, INLET PROTECTION & TREE PROTECTION FENCING.
4. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE "VERMONT DEC LOW RISK SITE HANDBOOK FOR EROSION PREVENTION & SEDIMENT CONTROL", DATED 2006.
5. DURING THE NON-WINTER CONSTRUCTION SEASON, 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 PRECIPITATION IS FORECAST DURING THAT PERIOD.
 - B. WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2-FEET OR MORE IN DEPTH.
6. THE PERIOD BETWEEN NOVEMBER 1ST AND APRIL 15TH IS CONSIDERED THE "WINTER CONSTRUCTION PERIOD". IF SOILS WILL BE EXPOSED AFTER NOVEMBER 1ST, A PLAN FOR WINTER CONSTRUCTION MUST BE DEVELOPED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER ON OR BEFORE OCTOBER 1ST. THE CONTRACTOR SHALL ENSURE SEDIMENT CONTROL IS INSTALLED PRIOR TO THE SOIL FREEZING. AN INSPECTION WILL BE REQUIRED IF THE PROJECT IS COMPLETED DURING THE WINTER MONTHS TO ENSURE THE SITE IS SECURED FOR THE REMAINDER OF THE SEASON.
7. DURING THE WINTER CONSTRUCTION SEASON, ANY NEW DISTURBANCE MUST BE STABILIZED (TEMPORARY OR FINAL) 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 PRECIPITATION IS FORECAST DURING THAT PERIOD.
 - B. WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2-FEET OR MORE IN DEPTH.
7. IN NO CASE SHALL SOIL BE EXPOSED FOR MORE THAN 14 DAY WITHOUT BEING STABILIZED.
8. ALL DISTURBED AREAS ARE TO BE PERMANENTLY STABILIZED WITHIN 48 HOURS OF FINAL GRADING.
9. THE PERIMETER OF THE SITE AND ALL Bmps SHALL BE INSPECTED AT THE END OF EACH WORK DAY TO ENSURE SEDIMENT DOES NOT LEAVE THE SITE. IF SEDIMENT HAS TRAVELED BEYOND THE PROJECT LIMITS, IT SHALL BE RELOCATED IN AN UPGRADE AREA ON SITE AT THE END OF EACH WORK DAY.
10. ALL STABILIZATION INVOLVING SEEDING IS TO BE COMPLETED BY SEPTEMBER 15TH.
11. THE CONTRACTOR SHALL BE 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.
12. IF DEWATERING IS REQUIRED FOR CONSTRUCTION, THE CONTRACTOR MUST UTILIZE SEDIMENT FILTER BAGS (OR ALTERNATE APPROVED BY THE ENGINEER) TO PREVENT DISCHARGE OF SEDIMENT-LADEN WATER OFF SITE.
13. EXCAVATED MATERIAL FROM EARTH EXCAVATION AND DITCH DIGGING SHALL BE PLACED ON-SITE IN A LOCATION TO BE APPROVED OF BY THE OWNER AND/OR THE ENGINEER OR USED FOR PROJECT FILL MATERIAL IF DETERMINED SUITABLE BY THE OWNER'S REPRESENTATIVE.
14. STOCKPILED MATERIAL (TOPSOIL, BORROW, ETC.) SHALL HAVE SILT FENCE CONSTRUCTED AROUND THE PERIMETER. THE STOCKPILED MATERIAL SHALL BE SEEDED AND MULCHED AS SOON AS POSSIBLE TO PREVENT SOIL EROSION AND SEDIMENTATION OFF SITE. LOCATE STOCKPILES ON THE UPHILL SIDE OF DISTURBED AREAS, IF POSSIBLE. DURING WINDY CONDITIONS, STOCKPILED MATERIAL SHALL BE COVERED OR WATERED APPROPRIATELY TO PREVENT WIND EROSION.
15. SLOPES GREATER THAN 3:1 SHALL HAVE EROSION CONTROL NETTING INSTALLED TO STABILIZE THE SLOPE AND REDUCE THE EROSION POTENTIAL. NETTING SHALL BE BIODEGRADABLE WITH A 12 MONTH LONGEVITY, S150BN AS MANUFACTURED OR APPROVED EQUIVALENT. INSTALL NETTING OVER MULCHED SLOPES SO THAT ALL PARTS ARE IN CONTACT WITH THE SOIL AND MULCH. PIN NETTING WITH WIRE STAPLES 3 FEET O.C. TO ENSURE FULL BONDING WITH SOIL SURFACE. THE SLOPE SURFACES SHOULD BE LEFT SLIGHTLY ROUGHENED AND NOT SMOOTH. IF LARGE AMOUNTS OF OFFSITE WATER WILL DRAIN OVER THESE SLOPES, TEMPORARY DIVERSION SWALES SHALL BE INSTALLED UP SLOPE UNTIL THE SLOPE VEGETATION STABILIZES.
16. THE OWNER SHALL BE NOTIFIED WHEN SITE WORK IS COMPLETED AND THE SITE IS STABILIZED. THE OWNER WILL COORDINATE WITH BURLINGTON DPW TO SCHEDULE A STABILIZATION INSPECTION.

Stamp

Chkd.

Description

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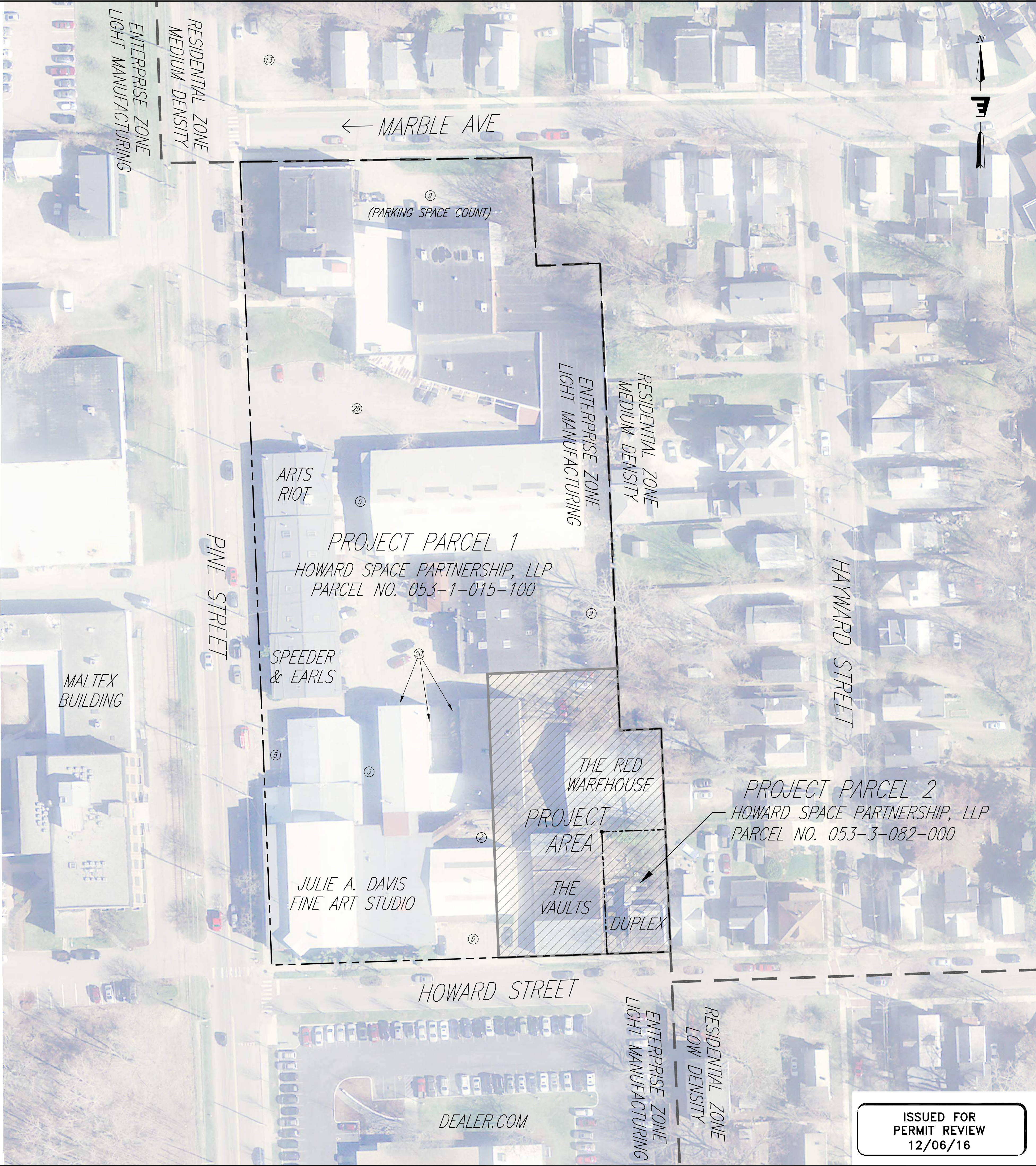
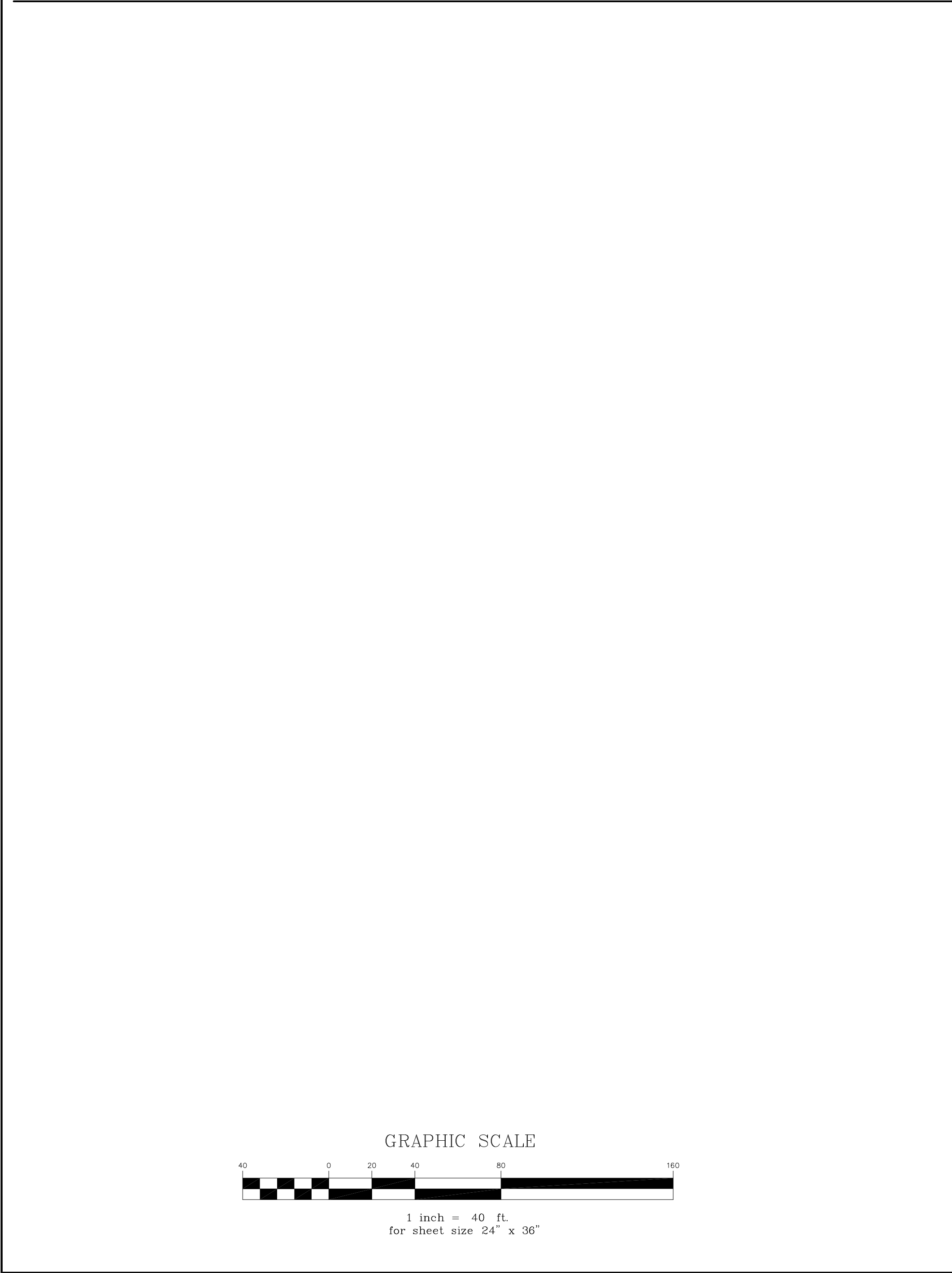
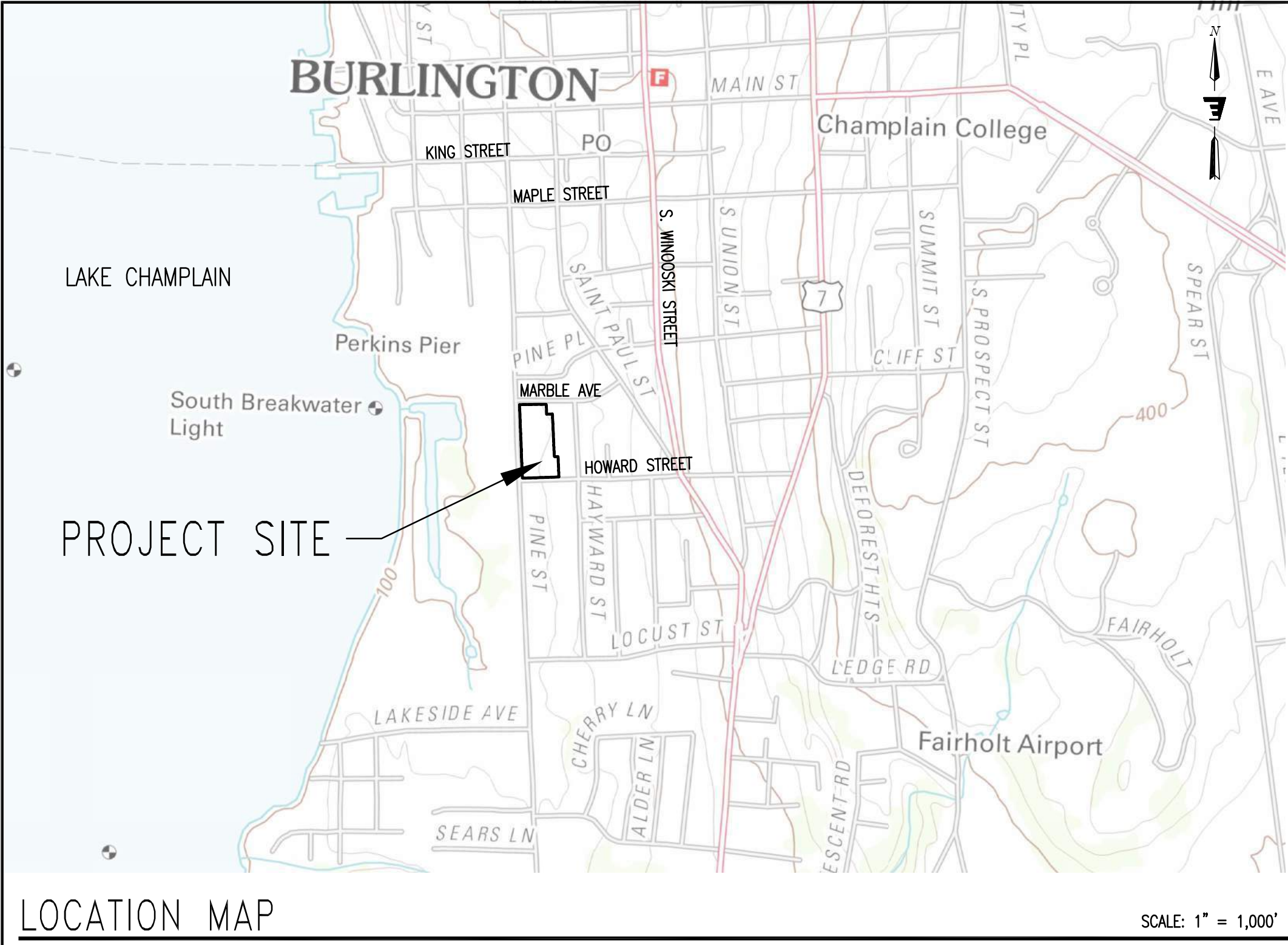
Client:
Unsworth Properties, LLC
26 Railroad Avenue
East
(802) 879-4504

Sheet Title: Erosion Prevention & Sediment Control Details
Project Title: The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By: KW/HKW
Checked By: KW
Drawn By: HKW
Scale: NOT TO SCALE
Date: 12/06/16

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EV#16414



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Client: Unsworth Properties, LLC
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Sheet Title: Overall Existing Conditions Plan

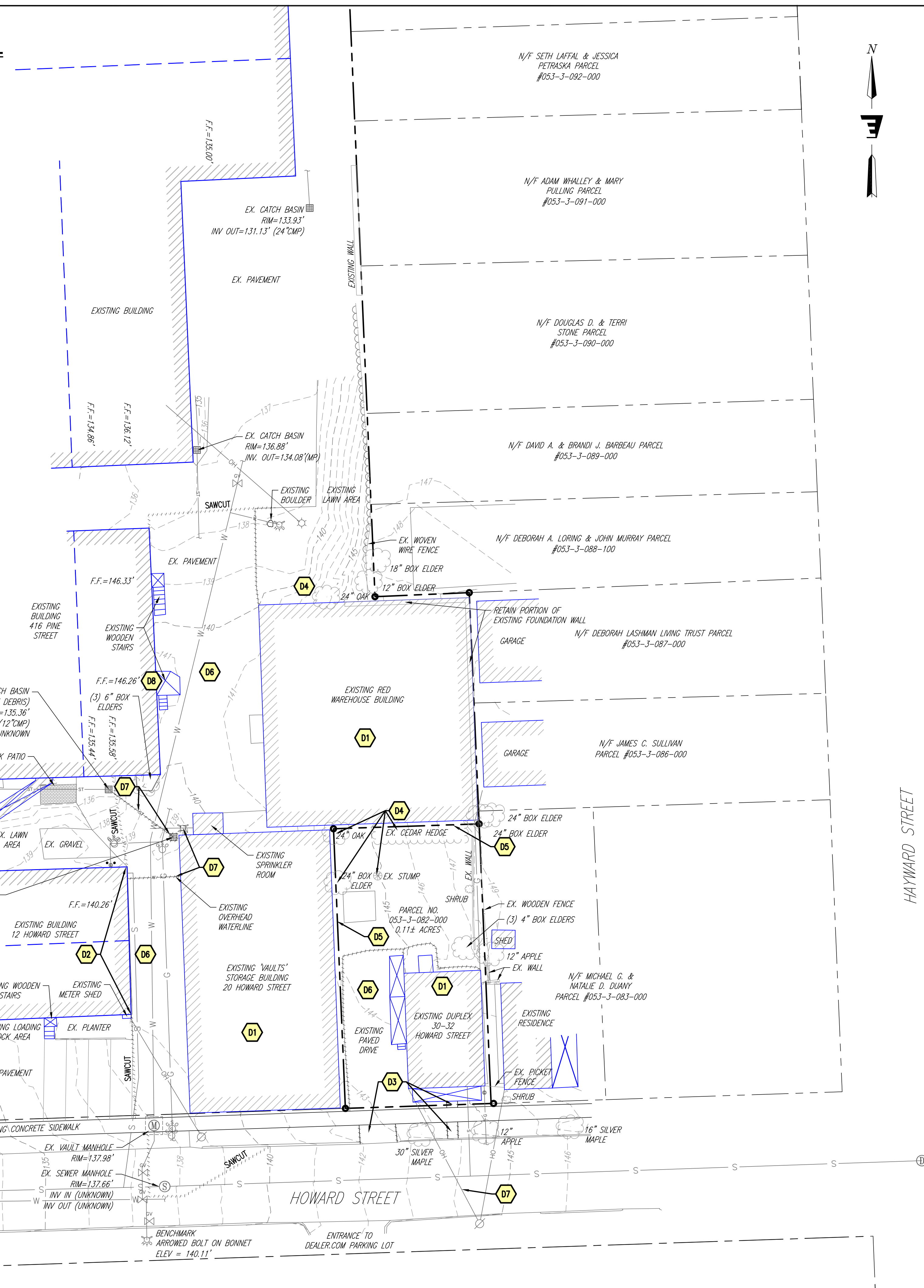
Project Title: The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By: KW/HKW
Checked By: KW
Drawn By: HKW
Scale: 1" = 40'
Date: 12/06/16

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EV#16414

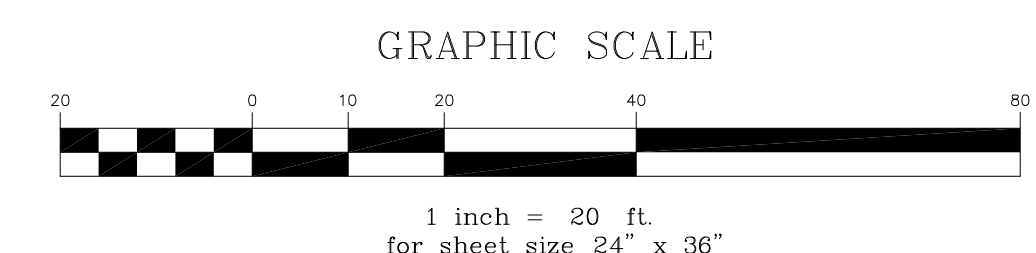
1. EXACT OBJECT LOCATIONS MAY DIFFER FROM AS SHOWN, AND ADDITIONAL SUB-SURFACE AND SURFACE UTILITIES AND STRUCTURES MAY EXIST. THE CONTRACTOR IS TO PROCEED WITH GREAT CARE IN EXECUTING ANY WORK AND TO CALL DIG SAFE 72 HOURS PRIOR TO ANY DIGGING, DRILLING OR BLASTING.
2. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY CONDITIONS THAT VARY FROM THOSE SHOWN ON THE PLANS. THE CONTRACTOR'S WORK SHALL NOT VARY FROM THE PLANS WITHOUT THE EXPRESSED APPROVAL FROM THE ENGINEER.
3. THE CONTRACTOR IS INSTRUCTED TO COOPERATE WITH ANY AND ALL OTHER CONTRACTORS PERFORMING WORK ON THIS JOB SITE DURING THE PERFORMANCE OF THIS CONTRACT.
4. THE CONTRACTOR SHALL RESTORE LAWNS, DRIVEWAYS, CULVERTS, SIGNS AND OTHER PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO EXISTING CONDITIONS OR BETTER AS DETERMINED BY THE ENGINEER. ANY DAMAGED TREES, SHRUBS AND/OR HEDGES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE, UNLESS NOTED OTHERWISE.
5. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIRED PERMITS.
6. THE OWNER SHALL BE RESPONSIBLE FOR OBTAINING, AND INCURRING THE COST OF ALL REQUIRED PERMITS, INSPECTIONS, AND CERTIFICATES.
7. THE CONTRACTOR WILL PROTECT EXISTING PROPERTY LINE MONUMENTATION. ANY MONUMENTATION DISTURBED OR DESTROYED, AS JUDGED BY THE ENGINEER OR OWNER SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER THE SUPERVISION OF A NEW HAMPSHIRE STATE LICENSED LAND SURVEYOR.
8. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE ALL PLAN SHEETS AND SPECIFICATIONS, AND COORDINATE WORK WITH ALL CONTRACTS FOR THE SITE.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONDUCT EXPLORATORY TEST PITS AS MAY BE REQUIRED TO DETERMINE UNDERGROUND CONDITIONS.
10. ALL TRENCH EXCAVATION AND ANY REQUIRED SHEETING AND SHORING SHALL BE DONE IN ACCORDANCE WITH THE LATEST OSHA AND VOSHIA REGULATIONS FOR CONSTRUCTION.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING AND THE MAINTENANCE OF SURFACE DRAINAGE DURING THE COURSE OF WORK.
12. MAINTAIN FLOW FOR ALL EXISTING UTILITIES, UNLESS NOTED OTHERWISE.
13. ALL SITE FILL SHALL MEET SELECTED FILL STANDARDS UNLESS NOTED OTHERWISE ON THE DRAWINGS.
14. CONTRACTOR TO GRADE ALL AREAS ON THE SITE TO PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDINGS AND IMPERVIOUS SURFACES.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL FIELD LAYOUT. THE CONTRACTOR SHALL PROVIDE MARKED-UP AS-BUILT PLANS FOR ALL UTILITIES SHOWING CONNECTIONS, BENDS, VALVES, LENGTHS OF LINES AND INVERTS. AS-BUILT PLANS SHALL BE REVIEWED BY THE OWNER AND HIS REPRESENTATIVES BEFORE UTILITIES WILL BE ACCEPTED.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER INSTALLATION, MONITORING, MAINTENANCE AND REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES AND TAKING PRECAUTIONARY STEPS TO AVOID ANY SEDIMENT TRANSFER TO NEIGHBORING SITES OR WATERS OF THE STATE.



EXISTING FEATURES		PROPOSED FEATURES	
	CLEAN OUT		C/O
	SEWER MANHOLE		
	CATCH BASIN		
	STORM MANHOLE		
	TAPPING SLEEVE AND VALVE		
	BOLLARD		
	GATE VALVE		
	HYDRANT		
	POST INDICATOR VALVE		
	WATER SHUT OFF		
	GAS SHUT OFF		
	GAS METER		
	LIGHT POLE		
	UTILITY POWER POLE		
	IRON PIPE/REBAR		
	SOIL BORING		
	SIGN		
+ 100.00	SPOT ELEVATION	+ 100.5	
	TREE		
	HANDICAP SYMBOL		
	TREELINE		
— X —	FENCE	— X —	
— ~ 100 —	5' CONTOUR INTERVAL	— 100 —	
— ~ 101 —	1' CONTOUR INTERVAL	— 101 —	
	PROPERTY LINE		
	EDGE OF PAVEMENT/HARDSCAPE		
— S —	SANITARY SEWER LINE	— S —	
— ST — ST —	STORM LINE	— ST —	
— W —	WATER LINE	— W —	
— UE —	UNDERGROUND ELECTRIC	— UE —	
— OH —	OVERHEAD ELECTRIC	— OH —	
— UT —	UNDERGROUND TELEPHONE	— UT —	
— G —	GAS LINE	— G —	
— — —	RIGHT-OF-WAY LINE	— — —	
	SETBACK		
	FEATURE TO BE DEMOLISHED		

D1 EXISTING BUILDING	D5 EXISTING PROPERTY LINE TO BE DISSOLVED AND LOTS MERGED
D2 EXISTING SIDING	D6 EXISTING PAVEMENT
D3 EXISTING CONCRETE	D7 EXISTING UTILITY LINE/STRUCTURE
D4 EXISTING TREES/SHRUBS	D7 EXISTING LOADING DOCK

1. EXISTING PHYSICAL FEATURES AND TOPOGRAPHY SHOWN HERE ARE BASED ON A PLAN ENTITLED "SITE PLAN OF LANDS OF HOWARD SPACE PARTNERSHIP, LLP, 30 HOWARD ST & 400 PINE ST, BURLINGTON, VERMONT", PREPARED BY TERRY W. WILSON, VERMONT LICENSED LAND SURVEYOR AND DATED JULY 2016.
2. PROPERTY LINES DEPICTED HERE ARE TAKEN FROM A PLAT ENTITLED "PLAT OF A PORTION OF LANDS OF HOWARD SPACE PARTNERSHIP, LLP, 30 HOWARD ST & 400 PINE ST, BURLINGTON, VERMONT", PREPARED BY VERMONT MAPPING AND SURVEY CO., LLC, DATED JULY, 2016. THE PURPOSE OF SAID PLAT IS TO DEPICT LOT #053-3-082-000 AND THE EASTERLY LINE OF LOT #053-1-015-100. REFER TO PLAT FOR ADDITIONAL NOTES AND REFERENCES.
3. UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES. EXISTING UTILITIES SHOWN ON PLANS WERE TAKEN FROM THE ABOVE REFERENCED PLAN AND ARE NOT GUARANTEED TO BE ACCURATE OR COMPLETE. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING UTILITY LOCATIONS PRIOR TO COMMENCING WORK. NOTIFY ENGINEER OF ANY DISCREPANCY BETWEEN UTILITIES AS SHOWN AND AS FOUND. THE CONTRACTOR SHALL CONTACT DIG SAFE (811 or 888-344-7233) A MINIMUM OF 72 HOURS, BUT NOT INCLUDING SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS, PRIOR TO ANY CONSTRUCTION.
4. NORTH ORIENTATION IS REFERENCED TO VERMONT GRID NORTH & ELEVATIONS ARE REFERENCED TO NAVD 88.



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12/06/16

Sheet Title: Existing Conditions & Demolition Plan	Project Title: The Vaults Redevelopment Project Pine Street & Howard Street Burlington, Vermont	Client: Unsworth Properties, LLC 26 Railroad Avenue Essex Junction, Vermont (802) 879-4504		 ENGINEERING VENTURES PC 200 River Avenue, Suite 2A Burlington, VT 05401 Tel. 802.863.0235 • Fax 802.863.6306 85 Mechanic Street, Suite 350A, Lebanon, NH 03766 tel. 603.442.9333 • Fax 603.442.9331 www.engineeringventures.com	Stamp
		Rev. No. Description	Chkd.		
Designed By: KW/HKW Checked By: KW Drawn By: HKW Scale: 1" = 20' Date: 12/06/16		C1.0 EV#16414			

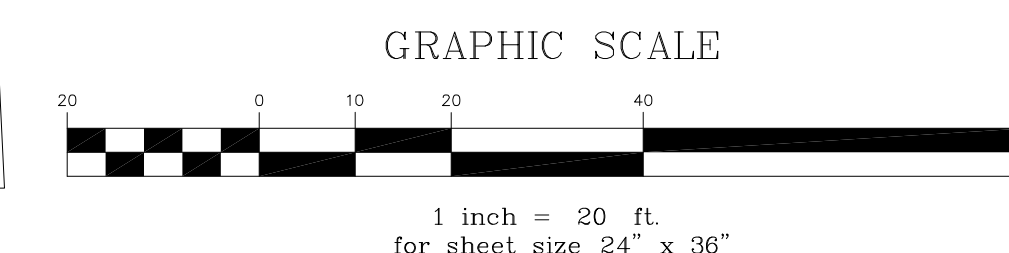
	PROPOSED PAVEMENT		PROPOSED LANDING
	PROPOSED CONCRETE		PROPOSED BIKE RACK
	PROPOSED CONCRETE CURB		PROPOSED 4' X 8' LOADING DOCK
	PROPOSED STAIRS		PROPOSED DUMPSTER/RECYCLING BINS
	PROPOSED 30' LONG RAMP AT MAX. 1:12 SLOPE		

ST1	PROPOSED TRENCH DRAIN RIM = 134.50 INV OUT = 133.00	ST1 TO ST2	33LF OF 12" HDPE AT 1% SLOPE
ST2	PROPOSED CATCH BASIN RIM = 134.00 INV IN = 132.67 INV OUT = 132.57	ST2 TO ST3	68LF OF 12" HDPE AT 1% SLOPE
ST3	PROPOSED CATCH BASIN RIM = 134.00 INV IN = 131.89 INV OUT = 131.79	ST3 TO ST4	43LF OF 12" HDPE AT 1% SLOPE
ST4	PROPOSED STORM MANHOLE RIM = 140.0 INV IN (ST3) = 131.36 INV IN (ST5) = 131.13 INV IN (ST8) = 135.47 INV OUT = 131.79	ST5 TO ST4	7LF OF 12" HDPE AT 1% SLOPE
		ST4 TO EX.	61LF OF 12" HDPE
		ST7 TO ST8	36LF OF 8" PVC AT 1% SLOPE
		ST8 TO ST4	28LF OF 8" PVC AT 1% SLOPE
ST5	PROPOSED STORMWATER DETENTION TANK		
ST6	PROPOSED GRASSED SWALE AT 2% SLOPE		
ST7	PROPOSED RAIN GARDEN FOREBAY WITH YARD DRAIN		
ST8	PROPOSED RAIN GARDEN WITH YARD DRAIN		
ST9	PROPOSED ROOF DRAIN		

 PROPOSED 6" PVC SEWER SERVICE LINE @ MIN. 2% SLOPE
 PROPOSED 6" D.I. WATER SERVICE LINE
 PROPOSED UNDERGROUND ELECTRIC LINE

TOTAL COMBINED LOT AREA:	±177,552-SF
EXISTING GREEN SPACE:	±21,208-SF *estimated from aerial photography
EXISTING LOT COVERAGE	$= \frac{(177,552-21,208)}{177,552} \times 100$ $= 88.08\% \text{ IMPERVIOUS}$
PROPOSED ADDED GREEN SPACE:	±1,725-SF
POST DEVELOPMENT GREEN SPACE	$= 21,208 + 1,725$ $= 22,933-SF$
POST DEVELOPMENT LOT COVERAGE	$= \frac{(177,552-22,933)}{177,552} \times 100$ $= 87.08\% \text{ IMPERVIOUS}$

EXISTING FEATURES		PROPOSED FEATURES
	CLEAN OUT	
	SEWER MANHOLE	
	CATCH BASIN	
	STORM MANHOLE	
	TAPPING SLEEVE AND VALVE	
	BOLLARD	
	GATE VALVE	
	HYDRANT	
	POST INDICATOR VALVE	
	WATER SHUT OFF	
	GAS SHUT OFF	
	GAS METER	
	LIGHT POLE	
	UTILITY POWER POLE	
	IRON PIPE/REBAR	
	SOIL BORING	
	SIGN	
	SPOT ELEVATION	
	TREE	
	PARKING SPACE COUNT	
	HANDICAP SYMBOL	
	TREE LINE	
	FENCE	
	5' CONTOUR INTERVAL	
	1' CONTOUR INTERVAL	
	PROPERTY LINE	
	EDGE OF PAVEMENT/HARDSCAPE	
	SANITARY SEWER LINE	
	STORM LINE	
	WATER LINE	
	UNDERGROUND ELECTRIC	
	OVERHEAD ELECTRIC	
	UNDERGROUND TELEPHONE	
	GAS LINE	
	RIGHT-OF-WAY LINE	
	SETBACK	



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**ENGINEERING
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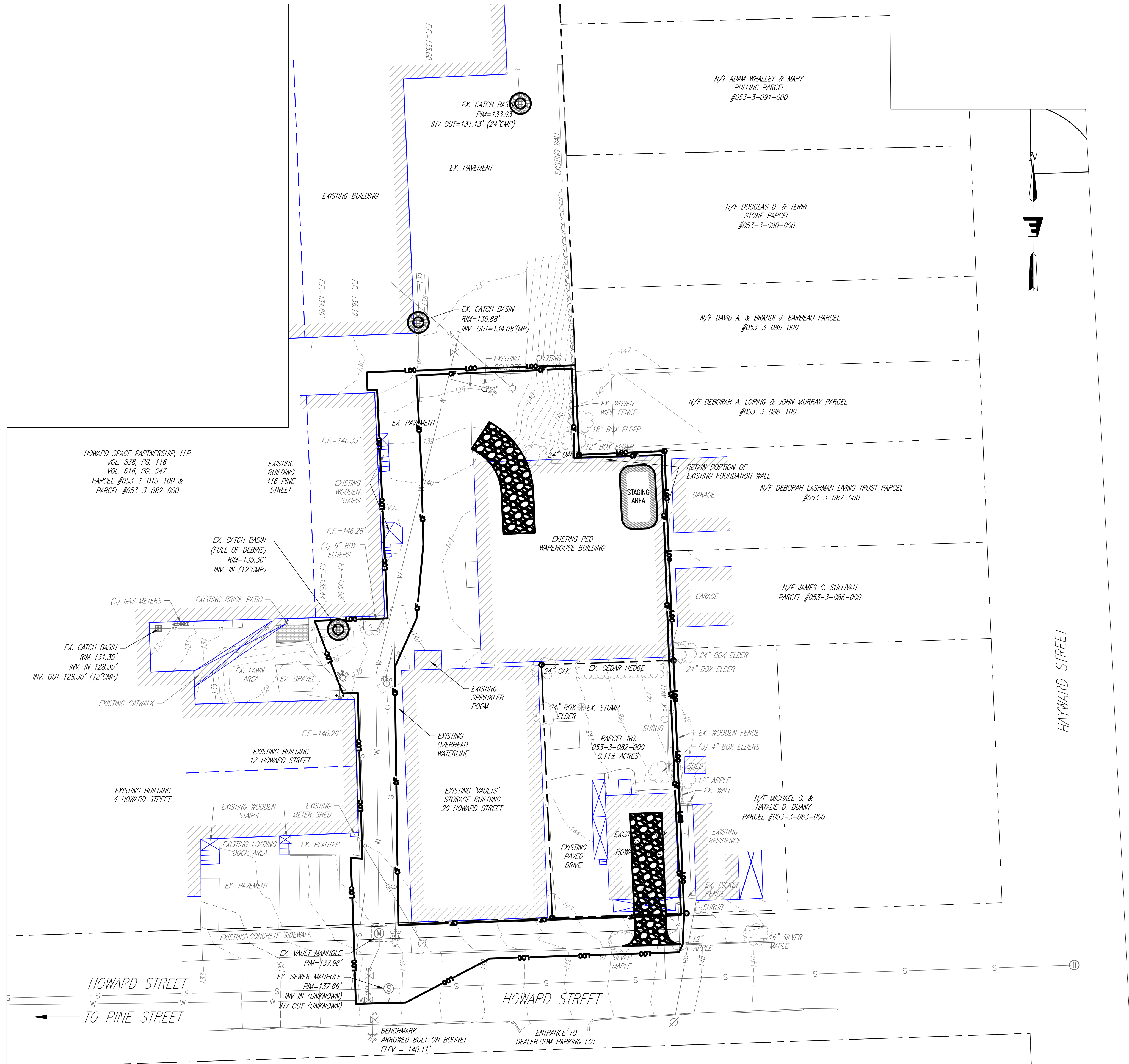
85 Mechanic Street, Suite 350A Lebanon, NH 03766
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www.engineeringventures.com

Unsworth Properties, LLC
26 Railroad Avenue
Essex Junction, Vermont
(802) 879-4504

Project Title: **The Vaults Redevelopment Project**
Pine Street & Howard Street
Burlington, Vermont

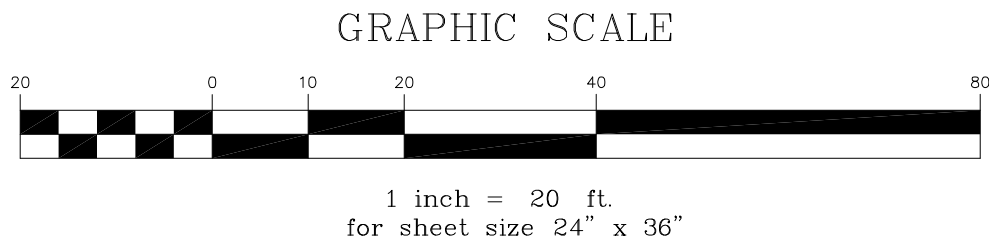
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EROSION CONTROL LEGEND

REFER TO SHEET CX.X FOR EPSC DETAILS AND NOTES

- 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.
- TEMPORARY INLET PROTECTION** - INSTALL AS INDICATED ON PLANS. STONE TO BE REMOVED AND REPLACED WITH CLEAN STONE WHEN SEDIMENT IS $\leq 1/2$ DEPTH OF STONE. REMOVE ALL SEDIMENT IF COLLECTED IN STRUCTURE AS SOON AS POSSIBLE.
- TEMPORARY STABILIZED CONSTRUCTION ENTRANCE**
THIS STRUCTURAL MEASURE IS A STABILIZED PAD OF AGGREGATE UNDERLAIN 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. ONCE REMOVED, THE IMPACTED AREA SHALL BE SEEDED AND MULCHED.
- TEMPORARY STAGING AND WASTE AREAS (APPROXIMATE)**
THESE ARE APPROVED LOCATIONS WHERE NON-SOIL, NON-ERODIBLE MATERIALS MAY BE STORED. SOILS SHALL NOT BE STORED IN THESE AREAS.
- CONSTRUCTION FENCING**
THIS STRUCTURAL MEASURE IS INSTALLED ALONG THE PERIMETER OF THE PROJECT AREA. IN MANY CASES THE LIMIT OF DISTURBANCE WILL COINCIDE WITH THE FENCING OR INDICATE BUFFER AREAS TO BE PROTECTED. THE FENCING IS EFFECTIVE WHEN USED TO SEPARATE THE PROJECT AREA FROM ADJACENT AREAS USED BY THE PUBLIC. 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 OWNER REQUIREMENTS AND COORDINATION.
- TEMPORARY 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. SILT FENCING IS EFFECTIVE IN REDUCING STORMWATER RUNOFF VELOCITIES, ASSIST IN THE DEPOSITION OF TRANSPORTED SEDIMENT LOAD AND PREVENT EROSION OF SOILS ONTO ADJACENT AREAS. THESE WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED.
- LIMITS OF CONSTRUCTION**
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, SPECIMEN TREES AND SPECIAL AREAS OF CONCERN.



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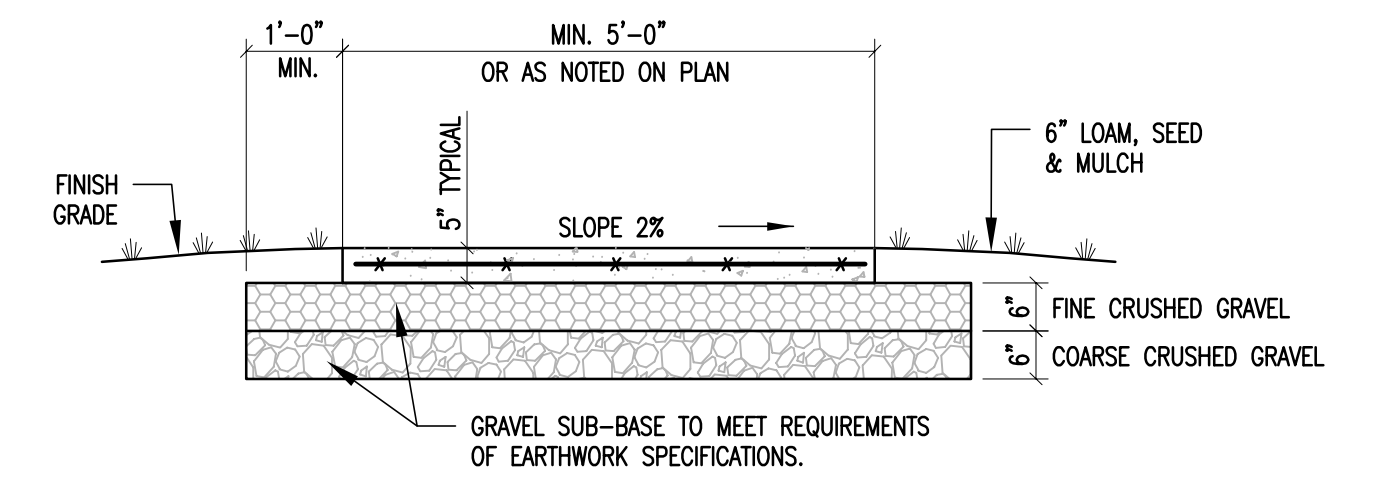
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Client: Unsworth Properties, LLC
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Sheet Title: Erosion Prevention & Sediment Control Plan
Project Title: The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By: KW/HKW
Checked By: KW
Drawn By: HKW
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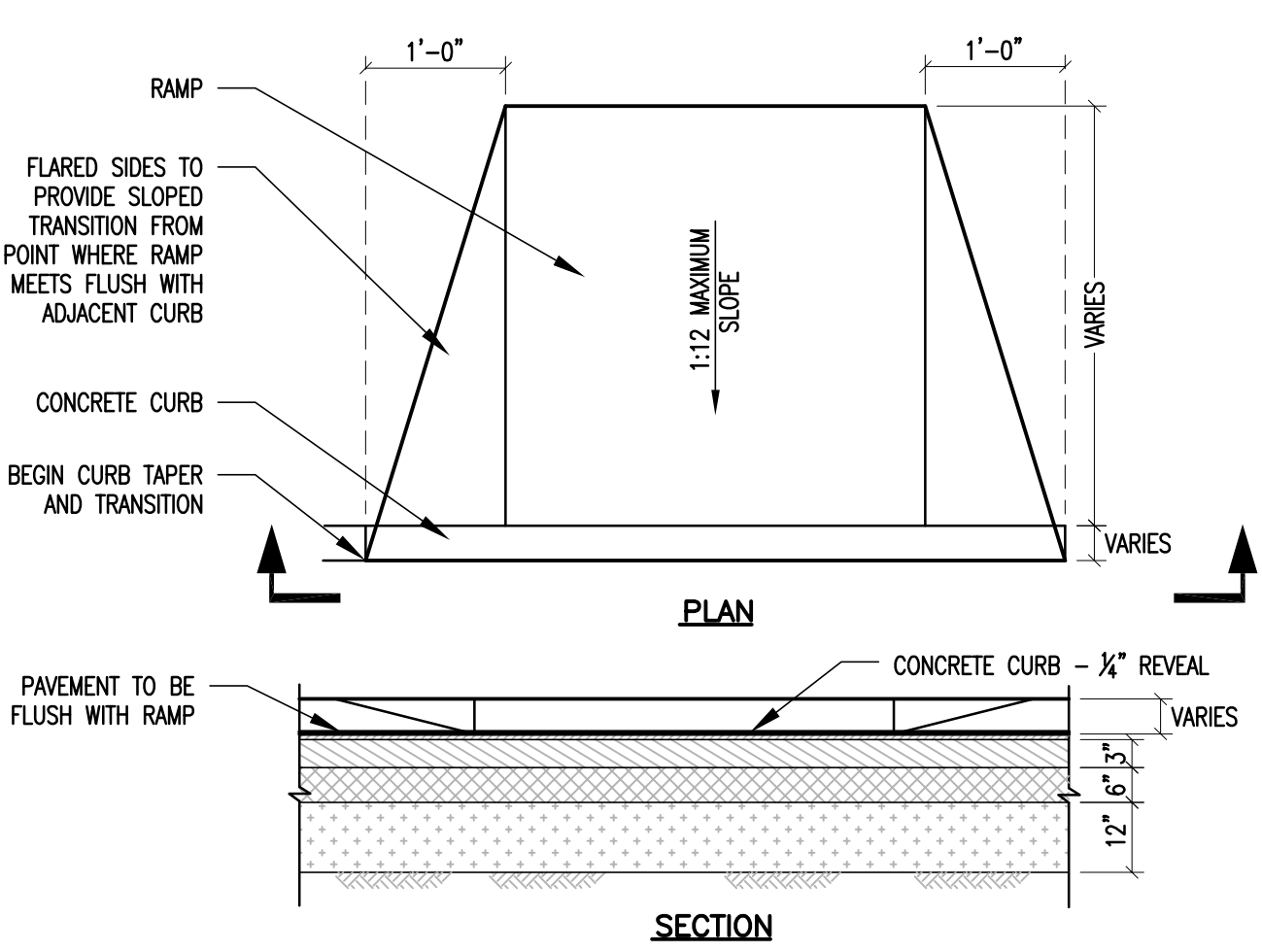
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- CONCRETE SIDEWALK NOTES:**
1. PLACE A TOOLED JOINT 1/8" WIDE AND AT LEAST 1/3 OF THE DEPTH AT MINIMUM 4'-0"oc. OR AS NOTED ON PLANS.
 2. PLACE EXPANSION JOINT EVERY 20'-0".
 3. BROOM FINISH WITH SMOOTH TROWELED EDGES. TREAT WITH SILANE-SILOXANE OR EQUAL.
 4. CAST-IN-PLACE CONCRETE TO BE 4000 psi CONCRETE, 5%-7% AIR ENTRAINMENT WITH 6x6-W4xW4.0 REINFORCING CENTERED IN SIDEWALK.
 5. WHERE SIDEWALK IS ADJACENT TO ENTRY/EXIT DOOR PADS WITH FROST WALL FOUNDATIONS, SIDEWALK SHALL BE DOWELED TO PAD.
 6. WHERE SIDEWALK IS ADJACENT TO OTHER HARDSCAPE FEATURES (CURB, WALL, LIGHTBASE, ETC.) SEPARATE WITH EXPANSION MATERIAL.

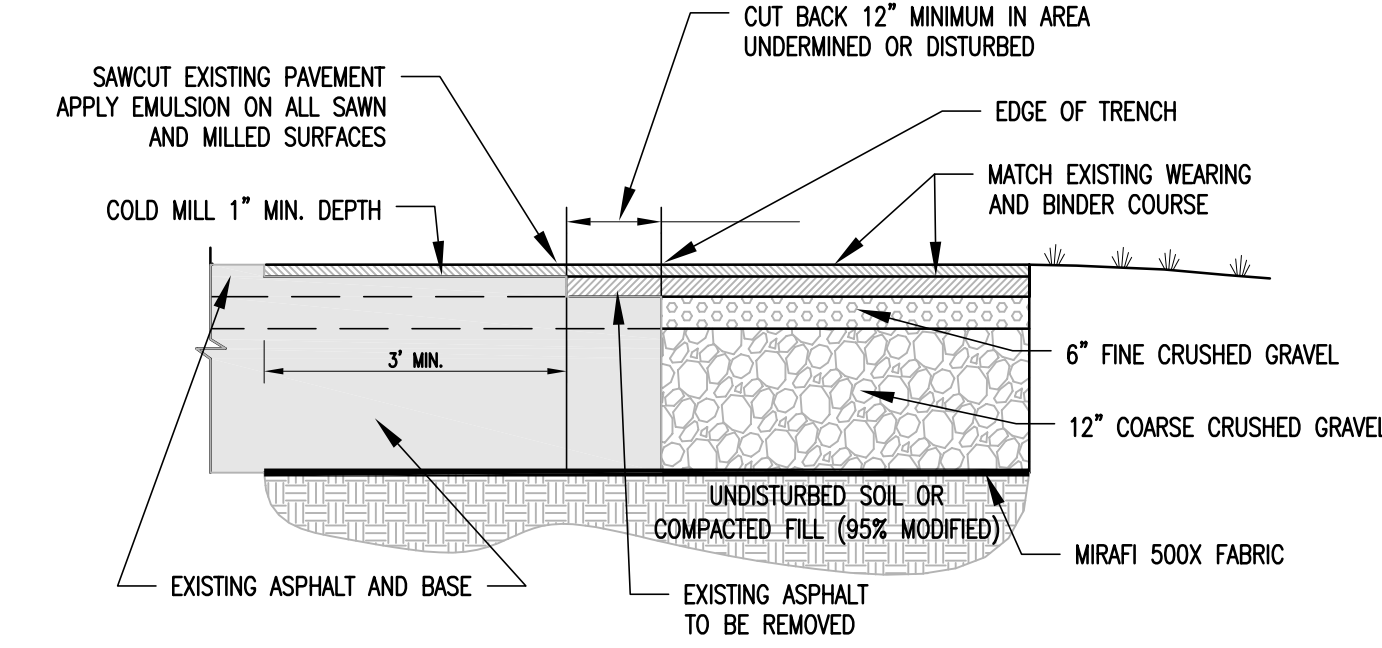
CONCRETE SIDEWALK DETAIL

NOT TO SCALE



HANDICAP RAMP/CURB CUT DETAIL

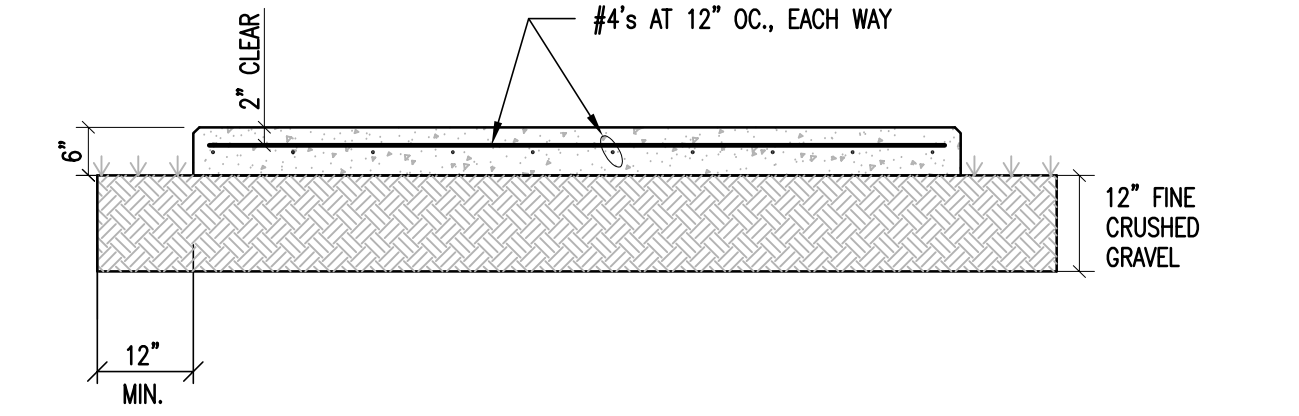
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- PAVEMENT PATCHING NOTES:**
1. IN ALL PAVEMENT AREAS TO BE PATCHED, SAW CUT AND REMOVE EXISTING PAVEMENT.
 2. EXCAVATE BASE MATERIAL AND SUB-BASE MATERIAL IF INADEQUATE.
 3. COMPACT ALL FILL MATERIAL TO 95% MODIFIED PROCTOR DENSITY.

PAVEMENT DETAIL

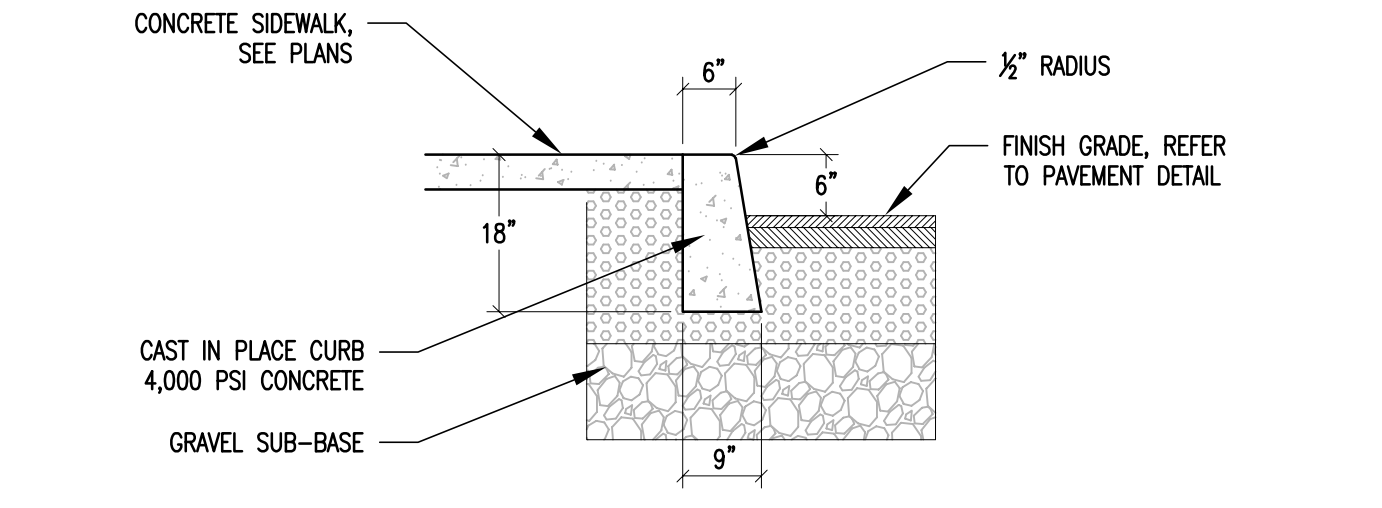
SCALE: NONE



- NOTES:**
1. CONCRETE TO BE 4000psi WITH 5-7% AIR ENTRAINMENT.
 2. BROOM FINISH WITH SMOOTH TROWELED EDGES. TREAT WITH SILANE-SILOXANE OR EQUIVALENT.
 3. REFER TO LAYOUT PLAN FOR SIZE AND LOCATION.

EXTERIOR CONCRETE PAD DETAIL

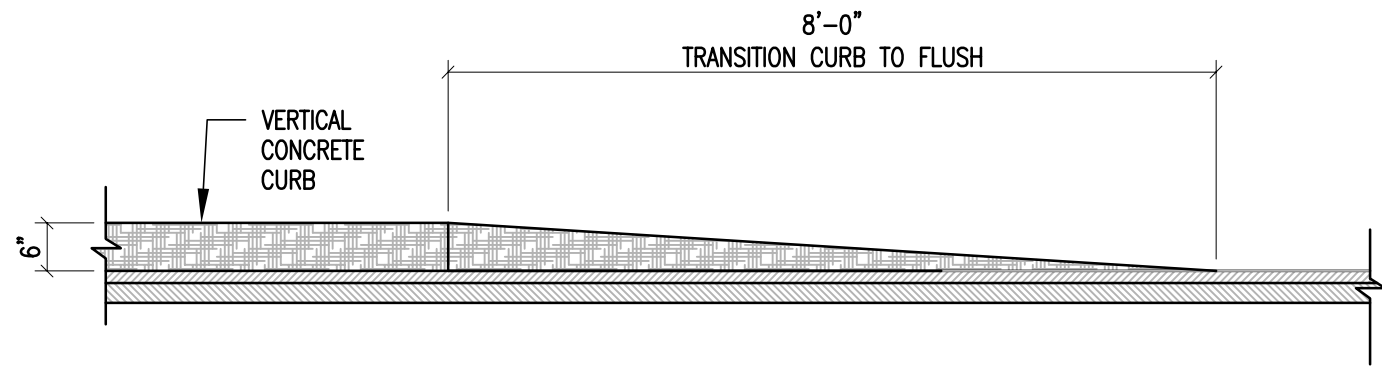
SCALE: NONE



- CONCRETE CURB NOTES:**
1. CONSTRUCT CURBING IN 10'-0" SECTIONS WITH 1/8" JOINT BETWEEN SECTIONS
 2. EXPANSION JOINTS AT 20'-0" oc. MAX
 3. CONCRETE CURBS SHALL BE CONSTRUCTED IN ACCORDANCE WITH VTRANS SPECIFICATIONS.
 4. INSTALL 1/2" EXPANSION MATERIAL BETWEEN CURB AND ADJACENT HARD FEATURES (SIDEWALK, LIGHT BASE, ETC.).

CONCRETE CURB DETAIL

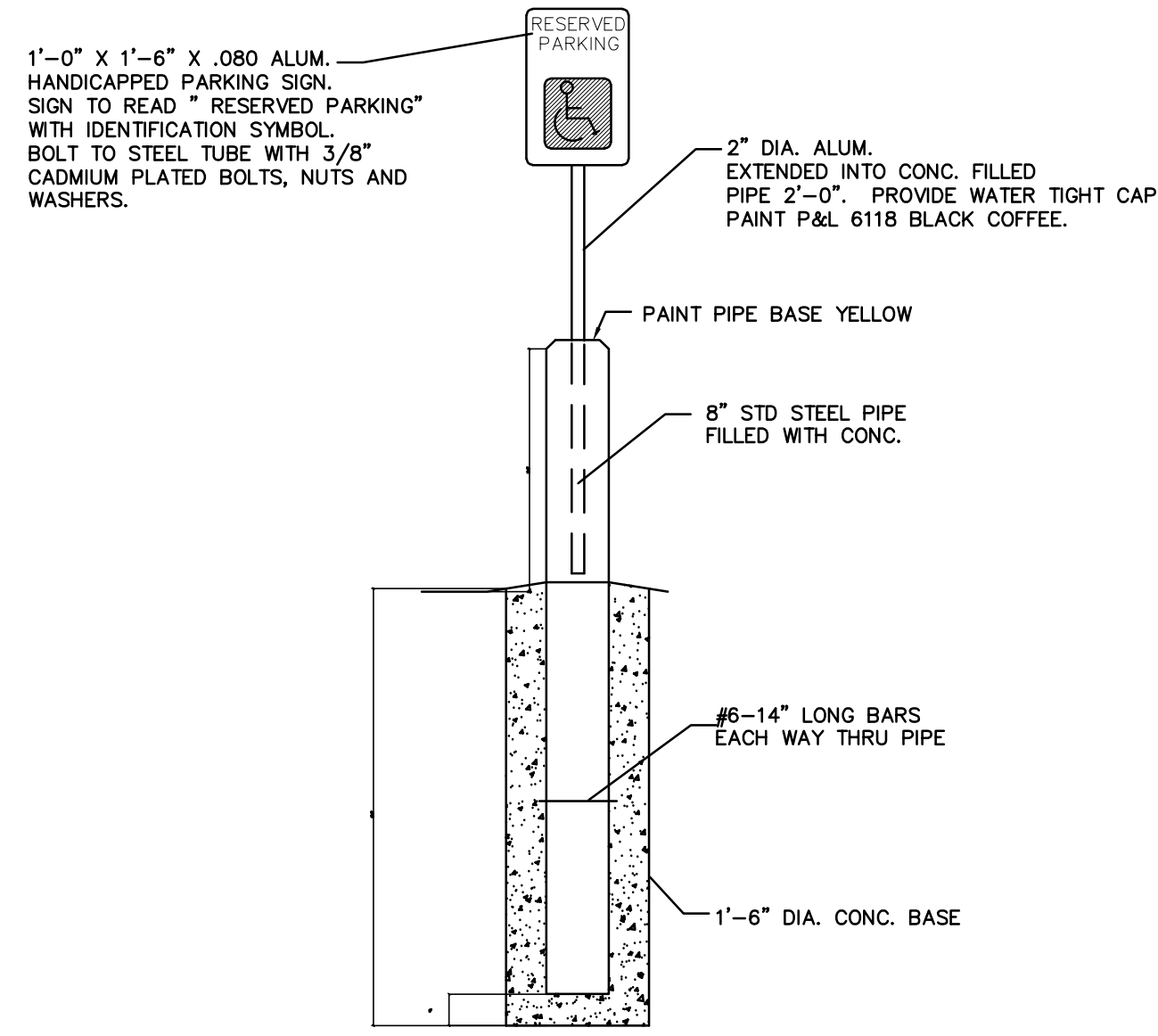
SCALE: NONE



NOTE:
PAVEMENT DETAIL FOR SUB-BASE DETAILS.

TAPERED CONCRETE CURB DETAIL

NOT TO SCALE



PROPOSED HANDICAPPED PARKING SIGN

SCALE: NONE

EARTHWORK SPECIFICATIONS

1. PRIOR TO THE START OF THE WORK, A PRE-CONSTRUCTION MEETING WILL BE HELD WITH THE TOWN ENGINEER, CONTRACTOR, OWNER, AND PROJECT ENGINEER TO REVIEW PROCEDURES, IDENTIFY RESPONSIBILITIES, UNLESS STATED OTHERWISE, ALL MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE APPLICABLE STATE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. CLEARING AND GRUBBING- ALL TOPSOIL AND UNSUITABLE MATERIALS SHALL BE REMOVED FROM THE DRIVEWAY, PARKING LOT, AND SIDEWALK LIMITS. THE DRIVEWAY AND PARKING LOT BASE MATERIAL SHALL EXTEND ONE FOOT BEYOND THE EDGE OF PAVING.
3. BASE COURSE- THE BASE COURSE SHALL CONSIST OF TWELVE INCHES OF GRAVEL AND SIX INCHES OF CRUSHED GRAVEL. GRADATION CURVES COMPLYING WITH AASHTO T27 AND T11 SHALL BE PROVIDED FOR THE ENGINEERS REVIEW PRIOR TO CONSTRUCTION.
4. COMPACTION SHALL BE PERFORMED USING VIBRATORY ROLLERS AND WATER IN LIFTS OF NO GREATER THAN TWELVE 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 DETERMINED IN ACCORDANCE WITH AASHTO T99.
5. COMPACTION TESTING SHALL BE PERFORMED FOR EVERY LAYER OF MATERIAL PLACED AND FOR EVERY 1000 SQUARE FEET OF AREA.
6. PAVEMENT SHALL MEET APPLICABLE STATE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION REQUIREMENTS, IN ADDITION TO APPLICABLE TOWN ROAD STANDARDS.
7. PAVEMENT SHALL NOT BE INSTALLED WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT, NOR WHEN THE ROAD BASE TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT. PAVEMENT SHALL NOT FALL BELOW 185 DEGREES FAHRENHEIT PRIOR TO THE COMPLETION OF ROLLING. PAVEMENT SHALL NOT BE INSTALLED WHEN THE SUBGRADE IS FROZEN OR THE GRADES ARE INCORRECT.
8. ALL REMAINING DISTURBED AREAS WITHIN THE RIGHT OF WAY SHALL BE FERTILIZED AND SEEDED IN ACCORDANCE WITH APPLICABLE STATE SPECIFICATIONS.
9. THE SEEDING OF SLOPES AND DITCHES SHALL REQUIRE THE USE OF EROSION CONTROL MATTING.
10. TOWN INSPECTION REQUIREMENTS:
 - A. BASE GRAVEL - INSTALLED AND COMPACTED
 - B. CRUSHED GRAVEL - INSTALLED AND COMPACTED
 - C. PAVEMENT INSTALLATION
 - D. UTILITY INSTALLATION - TOWN MUST BE PRESENT DURING INSTALLATION OF WATER, SEWER, CABLE PIPES, ETC.
 - E. WEEKLY INSPECTIONS OF AS-BUILT DRAWINGS
 - F. FINAL INSPECTION PRIOR TO RELEASE OF SURETY
11. COST OF INSPECTION AND TESTING SHALL BE PAID BY THE APPLICANT.
12. 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:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	2 INCHES	100
	1-1/2 INCHES	90 - 100
	3/4 INCHES	70 - 100
	NO. 4	60 - 100
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
C. 1 1/2" CRUSHED STONE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	1-3/4 INCH	100
	1-1/2 INCHES	90 - 100
	1 INCH	20 - 55
	3/4 INCH	0 - 15
D. GRAVEL SUB-BASE:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	NO. 4	20 - 60
	NO. 100	0 - 12
	NO. 200	0 - 6
	NO. 4	0 - 6
E. 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. 100	0 - 12
F. GRANULAR BACKFILL:	SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
	3 INCHES	100
	NO. 4	45 - 75
	NO. 100	0 - 12
	NO. 200	0 - 6

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Client:

Unsworth Properties, LLC

26 Railroad Avenue

East Montpelier, Vermont

(802) 879-4504

Project Title:

The Vaults Redevelopment Project

Pine Street & Howard Street

Burlington, Vermont

Sheet Title:

Site Details

Designed By:

KW/HKW

Checked By:

KW

Drawn By:

HKW

Scale:

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Date:

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SEWER NOTES

A-01. BUILDING SEWERS

- A. MATERIALS: THE BUILDING SEWER SHALL BE CONSTRUCTED IN A MANNER WHICH WILL PREVENT LEAKING, BREAKING OR CLOGGING. ACCEPTABLE MATERIALS FOR THE SEWER ARE RUBBER-RING-JOINTED PVC GRAVITY SEWER PIPE SDR35 ASTM D3034.
- B. SIZING AND SLOPE: MINIMUM BUILDING SEWER SIZE IS 4 INCHES (UNLESS SHOWN ON THE PLAN) AND A MINIMUM SLOPE IS 1/4 INCH PER FOOT.
- C. MANHOLES: BUILDING SEWERS DISCHARGING TO A COLLECTION SEWER SHALL BE CONNECTED THROUGH A MANHOLE OR WITH A WYE FITTING SO AS TO DIRECT FLOW AND MINIMIZE IN-LINE TURBULENCE.
- D. CLEANOUTS: CLEANOUTS SHALL BE PROVIDED AT EACH HORIZONTAL CHANGE IN DIRECTION OF THE BUILDING SEWER GREATER THAN 45 DEGREES, NOT GREATER THAN EVERY 100' AND WHERE INDICATED ON THE DESIGN DRAWINGS. BUILDING SEWER CHANGES IN DIRECTION WHICH EXCEED 45 DEGREES SHOULD BE MADE WITH TWO 45 DEGREE ELLS OR LONG SWEEP FITTINGS. MANHOLES ARE ACCEPTABLE IN LIEU OF CLEANOUTS. WHERE BUILDING SEWERS ARE TO BE INSTALLED AT A DEPTH OF LESS THAN 3 FEET UNDER DRIVEWAYS ARE ANTICIPATED, EXTRA HEAVY CAST IRON PIPE SHALL BE USED.
- E. LEAKAGE: BUILDING SEWERS SHALL MEET THE LEAKAGE STANDARDS PRESCRIBED IN THE STATE OF NEW YORK SPECIFICATIONS. SEE "A-02, J" BELOW FOR MORE DETAIL.

A-02. SEWER COLLECTION SYSTEMS:

- A. A SEWER COLLECTION SYSTEM IS THAT SYSTEM OF SEWERS THAT TRANSPORT WASTEWATER FROM BUILDING SEWERS TO THE WASTEWATER TREATMENT/ DISPOSAL SYSTEM.
- B. NO CONNECTIONS OF ROOF DRAINS, AREA DRAINS, FOUNDATION DRAINS, CELLAR DRAINS OR OTHER CLEAN WATER SOURCES OR ANY STORM DRAINS WILL BE ALLOWED TO BUILDING OR COLLECTION SEWERS.
- C. THE SIZE OF COLLECTION SEWERS SHALL BE AS SHOWN ON THESE DRAWINGS.
- D. DEPTH: SEWERS SHALL BE SUFFICIENTLY DEEP TO PREVENT FREEZING. RIGID FOAM INSULATION SHALL BE USED, WHERE INDICATED ON DRAWINGS.
- E. SLOPE: VELOCITY: ALL SEWERS SHALL BE INSTALLED WITH NOT LESS THAN THE SLOPES SHOWN BELOW:

PIPE SIZE (INCHES)	SLOPE (FEET/100 FEET)
6"	0.60
8"	0.40

- F. CHANGES IN PIPE SIZE: WHEN A SMALLER SEWER JOINS A LARGE ONE, THE INVERT OF THE LARGER SEWER SHALL BE LOWERED SUFFICIENTLY TO MAINTAIN THE SAME ENERGY GRADIENT.
- G. MATERIAL: PVC SDR 35, ASTM D3034, WITH PUSH-ON GASKETED JOINTS. GASKETS SHALL CONFORM TO ASTM D3212. SEWER JOINTS SHALL BE CONSTRUCTED TO MINIMIZE INFILTRATION AND TO PREVENT THE ENTRANCE OF ROOTS INTO THE SYSTEM.
- H. TRENCHING: LEDGE, ROCK, BOULDERS AND LARGE STONES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF FOUR INCHES BELOW AND ON EACH SIDE OF ALL PIPES.
- I. BEDDING: SEE TRENCH DETAILS THIS DRAWING FOR MATERIALS. TRENCH BACKFILL SHALL BE OF A SUITABLE NATIVE MATERIAL FREE FROM DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONES, ORGANIC MATTER, OR OTHER UNSTABLE MATERIALS.
- J. LEAKAGE TESTS: UPON COMPLETION OF SEWER MAIN CONSTRUCTION, THE SEWER LINE SHALL BE TESTED IN ACCORDANCE WITH THE STATE OF NEW YORK SPECIFICATIONS.

LEAKAGE TESTS FOR GRAVITY SEWERS

PERFORM A PRESSURIZED AIR TEST ON THE GRAVITY LINE IN ACCORDANCE WITH THE LATEST VERSION OF DESIGN STANDARDS FOR WASTEWATER TREATMENT WORKS ON EACH SECTION OF THE GRAVITY SEWER. THE ENGINEER SHALL BE GIVEN 24 HOURS NOTICE BEFORE THE TEST IS CONDUCTED. TEST MUST BE WITNESSED BY THE ENGINEER.

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

START THE TEST WHEN THE PRESSURE HAS STABILIZED AND IS AT OR ABOVE THE STARTING TEST PRESSURE OF 3.5 PSI ABOVE THE PIPE. IF THE PRESSURE DROPS MORE THAN 1.0 PSI DURING THE TEST TIME, THE LINE IS PRESUMED TO HAVE FAILED THE TEST. IF A 1.0 PSI DROP DOES NOT OCCUR WITHIN THE TEST TIME, THE LINE HAS PASSED THE TEST. THE TEST TIME SHALL BE DERIVED FROM THE FOLLOWING TABLE. IF THE SECTION OF LINE TO BE TESTED INCLUDES MORE THAN ONE PIPE SIZE, CALCULATE THE TEST TIME FOR EACH SIZE AND ADD THE TEST TIMES TO ARRIVE AT THE TOTAL TEST TIME FOR THE SECTION.

PIPE SIZE (INCHES)	T (TIME) (MIN/100 FT.)
3	0.2
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8

- K. INSTALLATION: PIPE SHALL BE LAID WITH BELL ENDS FACING UPGRADE AND LAYING SHALL START AT THE DOWNGRADE END.
- L. WATER LINE SEPARATION
- a. HORIZONTAL SEPARATION: SEWERS SHALL BE LAID FLAT AT LEAST TEN FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER LINE. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. WHERE IMPOSSIBLE OR IMPRACTICABLE, DUE TO LEDGE, BOULDERS OR OTHER UNUSUAL CONDITIONS, TO MAINTAIN THE TEN FOOT SEWER/WATER PIPE HORIZONTAL SEPARATION BETWEEN SEWER AND WATER LINES, THE WATER LINE MAY BE IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF IN THE SEWER TRENCH PROVIDED THAT THE BOTTOM OF THE WATER LINE IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER. WHEREVER IMPOSSIBLE OR IMPRACTICAL TO MAINTAIN THE 18 INCH VERTICAL SEPARATION, THE SEWER LINE SHALL BE CONSTRUCTED TO NORMAL WATER LINE STANDARDS AND PRESSURE TESTED TO 50 PSI FOR 15 MINUTE PRIOR TO BACKFILLING. NO LEAKAGE SHALL BE ALLOWED FOR THIS TEST.

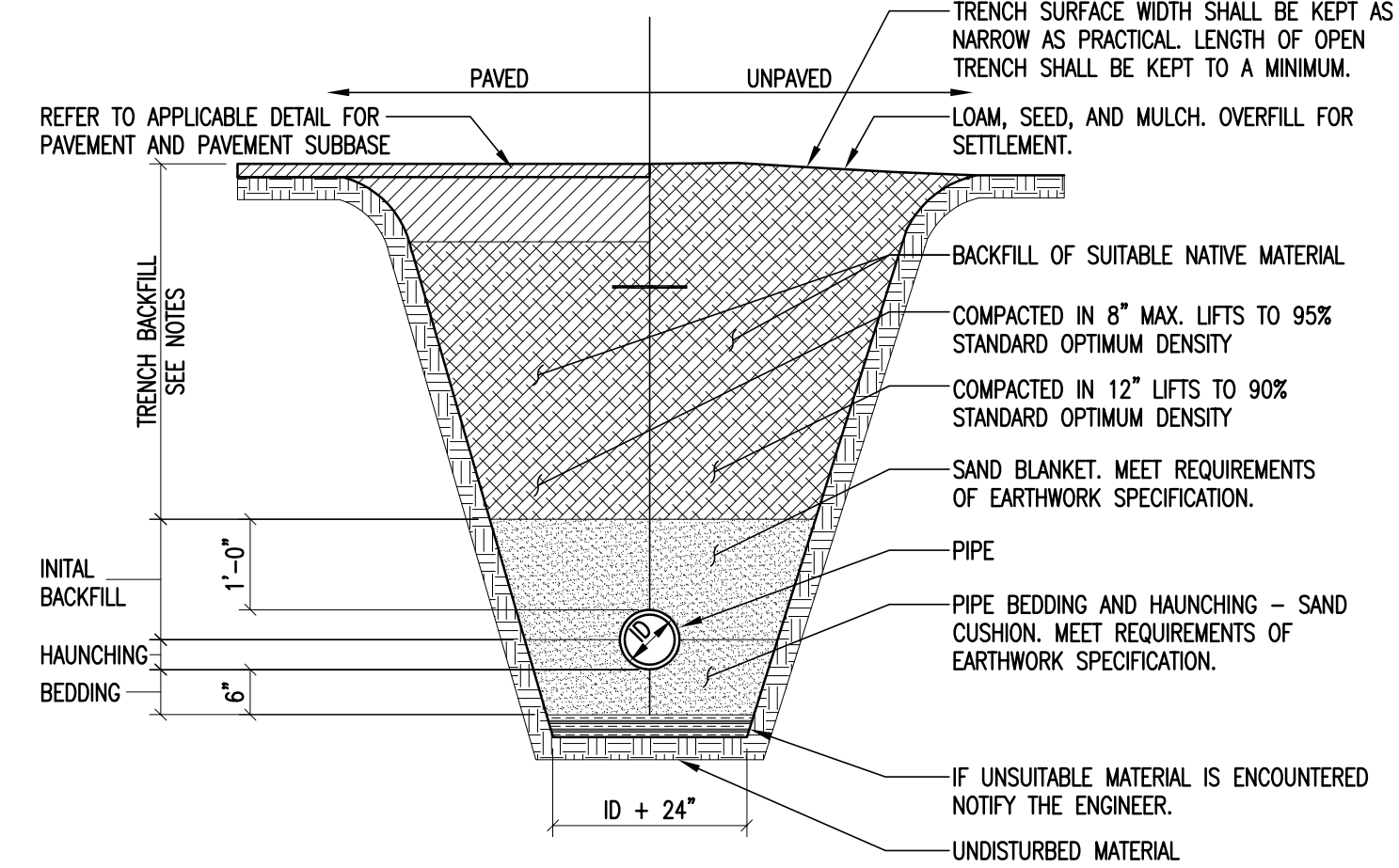
- b. CROSSINGS: SEWERS CROSSING WATER MAINS SHALL BE LAID BENEATH THE WATER MAIN WITH AT LEAST 18 INCHES VERTICAL CLEARANCE BETWEEN THE OUTSIDE OF THE SEWER AND THE OUTSIDE OF THE WATER MAIN. WHEN IT IS IMPOSSIBLE TO MAINTAIN THE 18 INCH VERTICAL SEPARATION:
1. THE CROSSING SHALL BE ARRANGED SO THAT ONE FULL LENGTH OF SEWER IS CENTERED ABOVE OR BELOW THE WATER LINE WITH SEWER JOINTS AS FAR AWAY AS POSSIBLE FROM WATER JOINTS;
 2. THE SEWER PIPE MUST BE CONSTRUCTED TO WATER MAIN STANDARDS FOR A MINIMUM DISTANCE OF 20 FEET EITHER SIDE OF THE CROSSING OR A TOTAL OF THREE PIPE LENGTHS, WHICHEVER IS GREATER;
 3. THE SECTION CONSTRUCTED TO WATER MAIN STANDARDS MUST BE PRESSURE TESTED TO MAINTAIN 50 PSI FOR 15 MINUTES WITHOUT LEAKAGE PRIOR TO BACKFILLING BEYOND ONE FOOT ABOVE THE PIPE TO ASSURE WATER TIGHTNESS;
 4. WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO PREVENT DAMAGE TO THE WATER MAIN.

A-03. MANHOLES

- A. DIAMETER: THE MINIMUM DIAMETER OF MANHOLES SHALL BE 48 INCHES; LARGE DIAMETERS ARE PREFERRED FOR CONNECTION TO LARGE DRAINAGE SEWERS. A MINIMUM ACCESS DIAMETER OF 24 INCHES SHALL BE PROVIDED.
- B. FLOW CHANNEL: FLOW CHANNELS SHALL BE PROVIDED IN THE BASE OF ALL MANHOLES AND THE FLOW CHANNEL THROUGH MANHOLES SHOULD BE MADE TO CONFORM IN SHAPE AND SLOPE TO THAT OF THE SEWERS.
- C. MANHOLES SHALL BE OF THE PRE-CAST CONCRETE OR FOUR-IN PLACE CONCRETE TYPE. MANHOLES SHALL BE WATERPROOFED ON THE EXTERIOR.
- D. INLET AND OUTLET PIPES SHALL BE JOINED TO THE MANHOLE WITH A RUBBER-GASKETED FLEXIBLE WATERTIGHT CONNECTION THAT ALLOWS DIFFERENTIAL SETTLEMENT OF THE PIPE AND MANHOLE WALL TO TAKE PLACE.
- E. ALL MANHOLES SHALL BE TESTED FOR LEAKAGE. LEAKAGE TESTING OF GRAVITY SEWERS UTILIZING THE WATER TESTING PROCEDURES TAKES INTO ACCOUNT THE LEAKAGE FROM ONE MANHOLE IN THE TEST SECTION. OTHERWISE, MANHOLES SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH THE FOLLOWING PROCEDURE:

AFTER THE MANHOLE HAS BEEN ASSEMBLED IN PLACE, ALL LIFTING HOLES AND EXTERIOR JOINTS SHALL BE FILLED WITH AND POINTED WITH AN APPROVED NON-SHRINKING MORTAR. ALL PIPES AND OTHER OPENINGS INTO THE MANHOLE SHALL BE SUITABLY PLUGGED AND THE PLUGS PLACED TO PREVENT BLOWOUT.

EACH MANHOLE SHALL BE CHECKED FOR INFILTRATION BY FILLING WITH WATER TO THE TOP OF THE CONE SECTION. A STABILIZATION PERIOD OF ONE HOUR SHALL BE PROVIDED TO ALLOW FOR ABSORPTION. AT THE END OF THIS PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE, IF NECESSARY, AND THE MEASURING TIME OF AT LEAST SIX HOURS BEGUN. AT THE END OF THE TEST PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE MEASURING THE VOLUME OF WATER ADDED. THIS AMOUNT SHALL BE CONVERTED TO A 24 HOUR RATE AND THE LEAKAGE DETERMINED ON THE BASIS OF DEPTH. THE LEAKAGE FOR EACH MANHOLE SHALL NOT EXCEED ONE GALLON PER VERTICAL FOOT FOR A 24 HOUR PERIOD FOR EXFILTRATION AND THERE SHALL BE NO VISIBLE INFILTRATION.



GENERAL TRENCH NOTES:

1. UNLESS OTHERWISE NOTED, ASSUME CLASS "C" SOILS. PERFORM ALL EXCAVATIONS TO OSHA REQUIREMENTS.
2. BEDDING TO PROVIDE A FIRM, STABLE, CONTINUOUS AND UNIFORM SUPPORT FOR FULL LENGTH OF PIPE.
3. NO MECHANICAL TAMPERS SHALL BE USED DIRECTLY OVER PIPE TO ENSURE PIPE IS NOT DAMAGED.
4. BACKFILL SHALL BE OF A SUITABLE MATERIAL, REMOVED FROM EXCAVATION EXCEPT WHERE OTHER MATERIAL IS SPECIFIED. DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONES, ORGANIC MATTER, OR OTHER UNSTABLE MATERIALS SHALL NOT BE USED FOR BACKFILL WITHIN TWO FEET OF THE TOP OF THE PIPE.
5. LEDGE, ROCK, BOULDERS AND LARGE STONES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF FOUR INCHES BELOW AND ON EACH SIDE OF ALL PIPES.
6. SUITABLE NATIVE SOIL MAY BE USED UNDER PAVED AREAS UPON APPROVAL OF ENGINEER.

SEWER TRENCH NOTES:

1. FOR BUILDING SEWERS THE MINIMUM DEPTH TO THE TOP OF THE PIPE SHALL BE 4'-0". WHERE BUILDING SEWERS ARE TO BE INSTALLED AT A DEPTH LESS THAN 3'-0" UNDER DRIVEWAYS, DUCTILE IRON CLS2 OR OTHER HIGH STRENGTH PIPE SHALL BE USED. OTHERWISE, REFER TO INSULATION OVER SHALLOW SEWER/STORM LINE DETAIL.
2. FOR SEWER COLLECTION SYSTEMS THE MINIMUM DEPTH TO THE TOP OF THE PIPE SHALL BE 5'-0". THIS DEPTH SHALL BE INCREASED TO 6'-0" IN AREAS TO BE FLOWED DURING THE WINTER MONTHS. OTHERWISE, REFER TO INSULATION OVER SHALLOW SEWER/STORM LINE DETAIL.

STORM TRENCH NOTES:

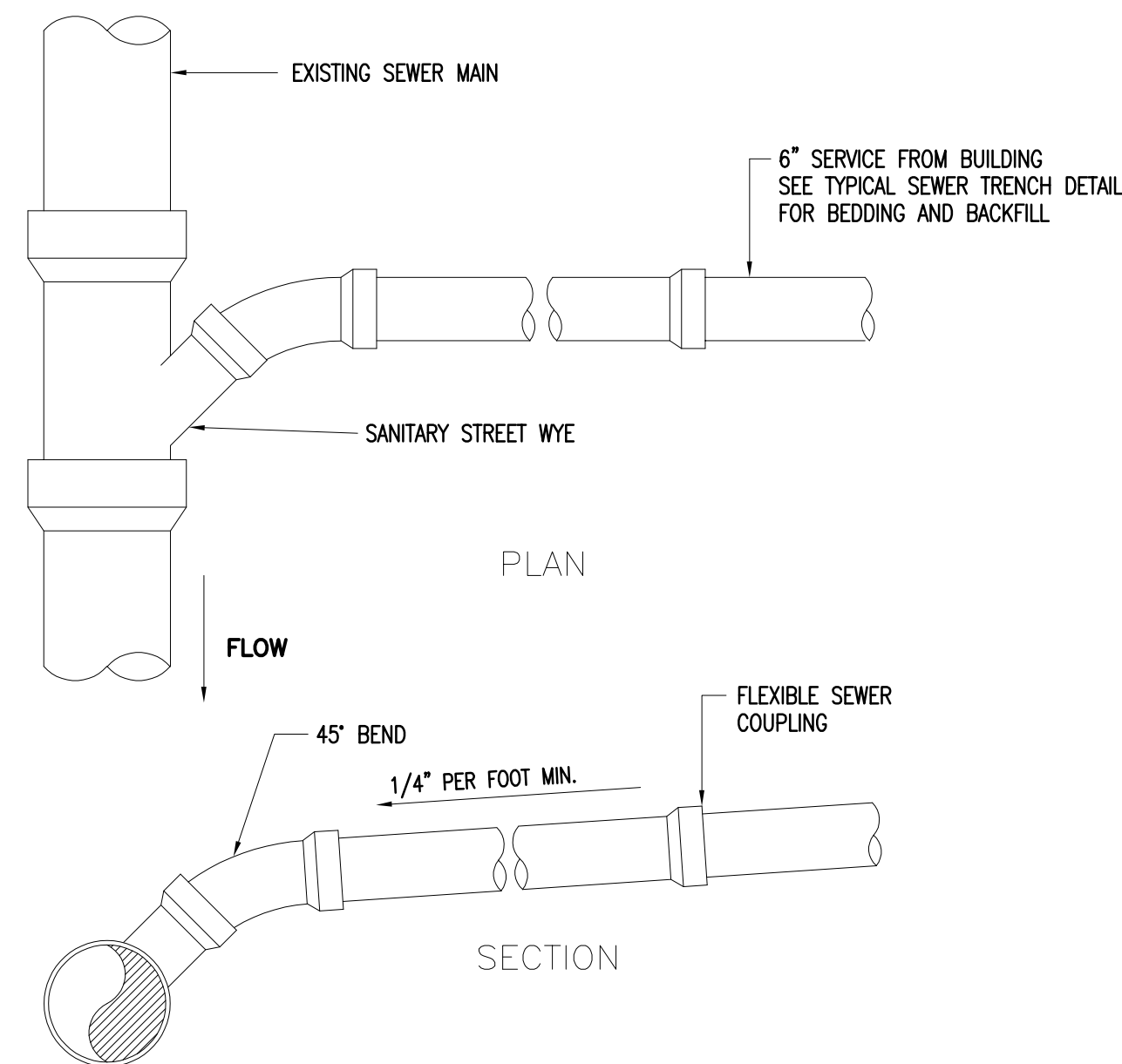
1. PROVIDE 6" OF COVER OVER DRAIN PIPE IN PAVED AREAS AND 5' OF COVER OVER PIPE IN UNPAVED AREAS. OTHERWISE REFER TO INSULATION OVER SHALLOW SEWER/STORM LINE DETAIL.
2. WHEN APPLICABLE, INSTALL PIPE WITH BELL ENDS DOWN SLOPE. PREVENT SEDIMENT FROM ENTERING NEW STORM DRAIN SYSTEM DURING CONSTRUCTION.

WATERLINE TRENCH NOTES:

1. MINIMUM DEPTH TO THE TOP OF THE WATERLINE SHALL BE 5'-6". OTHERWISE, REFER TO INSULATION OVER SHALLOW WATER LINE DETAIL.
2. INSTALL WATER LINE IN ACCORDANCE WITH LATEST AWWA STANDARDS.

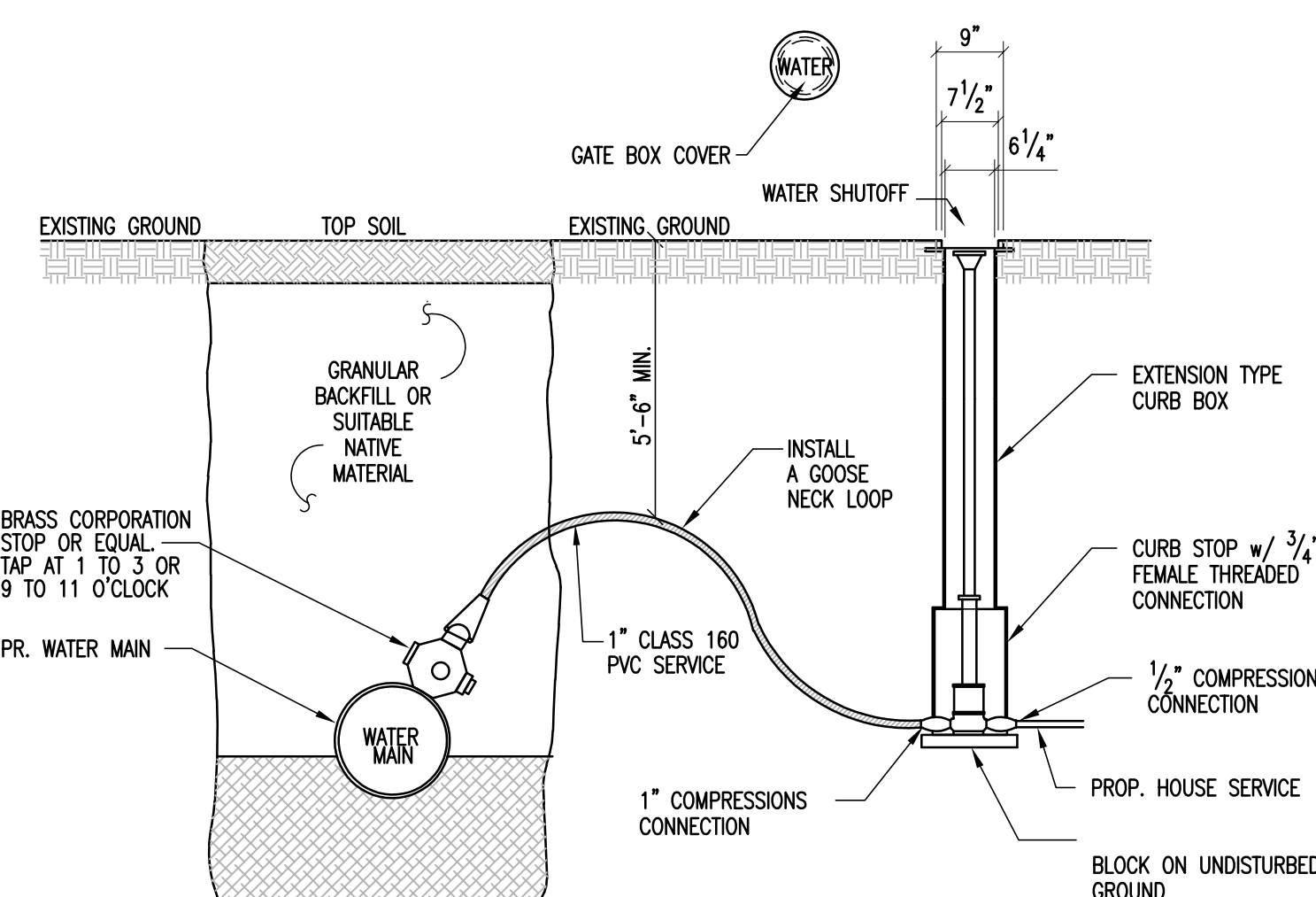
STORM/SEWER/WATER TRENCH DETAIL

NOT TO SCALE



SEWER SERVICE CONNECTION

NOT TO SCALE

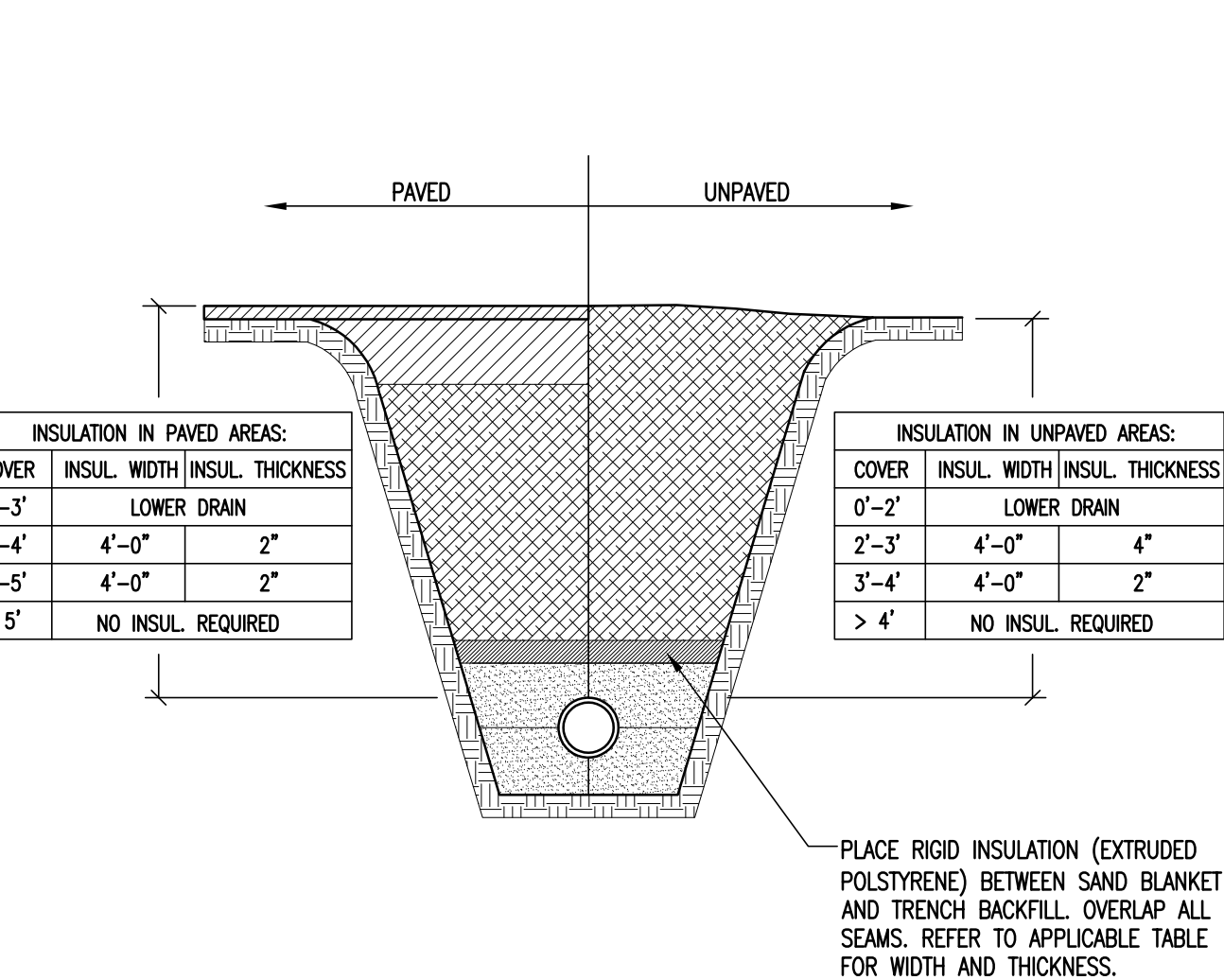


SERVICE CONNECTION NOTES:

1. TEFLON THREADED SEALANT TAPE WILL BE USED ON ALL CORPORATION STOPS PRIOR TO INSTALLATION.
 - A. SPIRAL WRAP COMPLETELY COVERING THE THREAD AREA WITH TWO WRAPS.
2. PIPE DOPE OR OTHER LIQUID THREAD SEALANTS ARE NOT ACCEPTABLE.
3. LEAVE UP TO THREE THREADS SHOWING OUTSIDE OF PIPE. A TORQUE OF 35 POUNDS IS RECOMMENDED.

WATER SERVICE CONNECTION DETAIL

NOT TO SCALE

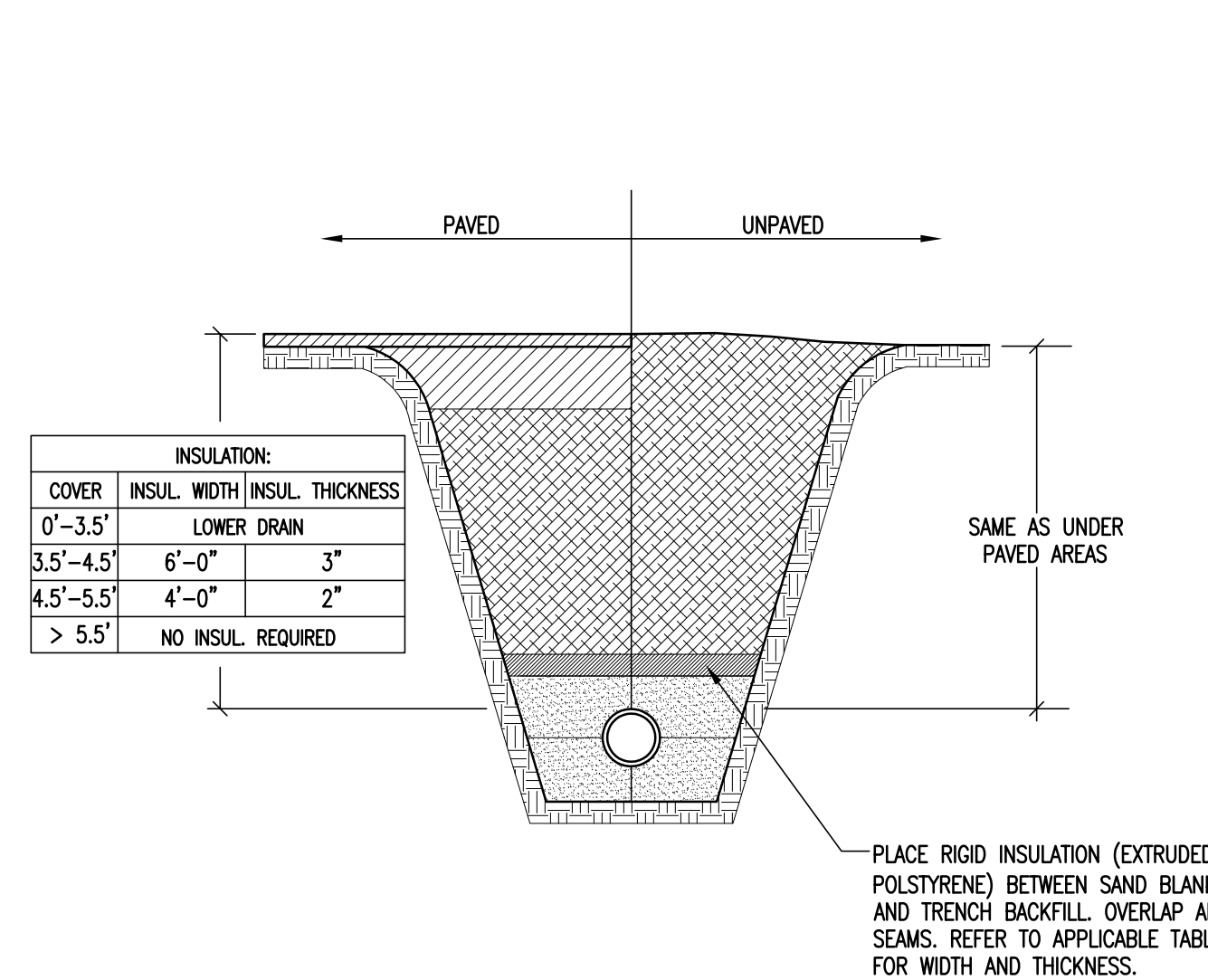


TRENCH NOTES:

1. REFER TO TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION.

INSULATION OVER SHALLOW SEWER LINE DETAIL

NOT TO SCALE



TRENCH NOTES:

1. REFER TO TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION.

INSULATION OVER SHALLOW WATER LINE DETAIL

NOT TO SCALE

WATER NOTES

WATER MAINS

1. PERFORM A HYDROSTATIC AND LEAKAGE TEST ACCORDING TO AWWA C600(LATEST REVISION) ON EACH PIPE LINE.
2. THE ENGINEER SHALL BE GIVEN AT LEAST 48 HOURS NOTICE BEFORE THE TEST IS CONDUCTED. TEST MUST BE WITNESSED BY THE ENGINEER.
3. SPECIFIED TEST PRESSURE IS A MINIMUM OF 200 PSI OR 1.5X THE WORKING PRESSURE, WHICHEVER IS GREATER, AND PRESSURE DURING TEST SHALL NOT VARY BY MORE THAN 5 PSI. SEE THE CURRENT EDITION OF AWWA C600 FOR ALLOWABLE LEAKAGE.

EXISTING UTILITIES

1. LOCATION OF UTILITY INSTALLATIONS AND UNDERGROUND STRUCTURES ARE SHOWN AS APPROXIMATE ON THE CONTRACT DOCUMENTS. SOME UTILITIES MAY NOT BE SHOWN.
2. ALL UTILITIES SHALL BE LOCATED BY THE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
3. EXISTING UTILITIES SHALL BE PROTECTED AND SUPPORTED DURING CONSTRUCTION.
4. ALL WATER, GAS, CABLE, TELEPHONE, ELECTRIC, SEWER, AND OTHER UTILITIES FOUND TO INTERFERE WITH THE PROPOSED CONSTRUCTION SHALL BE RELOCATED IN A MANNER ACCEPTABLE TO THE ENGINEER.

PIPE BEDDING

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

PIPE TRENCH BACKFILL

1. MEET EARTHWORK SPECIFICATIONS FOR PLACEMENT AND COMPACTION.

DUCTILE IRON PIPE (WATER)

1. D.I. PIPE CONFORM TO AWWA/ANSI C151.
2. LININGS AND LINING REPAIR TO AWWA/ANSI C104.
3. JOINTS CONFORM TO AWWA/ANSI C 111 AND C115.
4. FITTINGS CONFORM TO AWWA/ANSI C110, C153, C105.
5. KEEP INSIDE OF PIPE CLEAN AND FREE OF DEBRIS.
6. REJECT ANY PIPE WHICH IS DROPPED DURING HANDLING.
7. MECHANICAL JOINT GLANDS SHALL BE "MEGA-LUG" RETAINER GLANDS.
8. DUCTILE IRON FITTINGS: ANSI A21.10, 350 PSI PRESSURE RATING.
9. JOINTS: MECHANICAL, PUSH-ON, AND FLANGED:
 - A. RUBBER GASKET JOINT, ANSI A21.11
 - B. MECHANICAL AND PUSH-ON JOINTS: ANSI A21.11
 - C. FLANGED JOINT: 3/8" THICK RING OR FULL FACED RUBBER, ANSI A21.15.
10. GASKETS:
 - A. MECHANICAL AND PUSH-ON JOINTS: ANSI A21.11
 - B. FLANGED JOINT: 3/8" THICK RING OR FULL FACED RUBBER, ANSI A21.15.
11. BOLTS/NUTS:
 - A. MECHANICAL JOINT: ANSI A21.11
 - B. FLANGED JOINT: ANSI A21.15
12. LININGS:
 - A. INTERIOR - CEMENT LINED, DOUBLE THICKNESS BITUMINOUS SEAL
 - B. EXTERIOR-BITUMINOUS COATING APPROX. 1 MIL THICK, ANSI A21.51, ANSI A21.15, AND ANSI A21.10.
 - C. FLANGE MACHINED FACE COATING: ANSI A21.15.

LAYING PIPE

1. PIPE SHALL BE LAID WITH BELL ENDS FACING IN THE DIRECTION OF LAYING.
2. WHERE PIPE IS LAID ON A SLOPE OF 5% OR MORE, THE LAYING SHALL START AT THE LOW END AND PROCEED UPHILL, WITH THE BELL ENDS UPGRADE.
3. A WATER TIGHT PLUG SHALL BE PLACED IN THE OPEN ENDS OF INSTALLED PIPE WHEN PIPE LAYING IS NOT IN PROGRESS.
4. MAX. PERMISSIBLE DEFLECTION IS 75% OF AWWA SPEC. C600.

CHLORINATION OF DOMESTIC WATER LINES

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST 48 HOURS IN ADVANCE OF BEGINNING ANY DISINFECTION OF WATER MAINS
2. CONTRACTOR SHALL BE RESPONSIBLE FOR BACTERIOLOGICAL TESTING AS REQUIRED BY THIS SPECIFICATION AND REFERENCE STANDARDS MENTIONED.
3. DISINFECT ALL NEW PIPELINE SYSTEMS IN ACCORDANCE WITH AWWA C651, INCLUDING:
 - A. METHOD OF CHLORINE APPLICATION. USE CONTINUOUS FEED METHOD OR SLUG METHOD (TABLET METHOD IS NOT ACCEPTABLE).
 - B. FORM OF CHLORINE UTILIZED.
 - C. FINAL FLUSHING.
 - D. BACTERIOLOGICAL TESTING
 - E. REPETITION OF PROCEDURE

GATE VALVES

1. RESILIENT SEAT GATE VALVES BY KENNEDY "KEN-SEAL" OR EQUAL.
2. IRON BODY GATE VALVES TO MEET AWWA C-509-87.
3. STEM CONSTRUCTION: NON-RISING.
4. STEM SEALS: DOUBLE O-RING.
5. GATE: CAST IRON RESILIENT WEDGE WITH SYNTHETIC ELASTOMER COATING, AND SHALL BE EPOXY COATED (FUSION BONDED) INSIDE AND OUT.
6. BONNET HARDWARE SHALL MEET ASTM A307, CADMIUM PLATED.
7. OUTLET CONNECTION: STANDARD MECHANICAL JOINT
8. OPERATION: OPEN COUNTERCLOCKWISE.
9. TAPPING SLEEVES AND VALVES
10. TAPPING VALVES TO MEET ANSI/AWWA C509-87, STANDARD FOR RESILIENT SEATED GATE VALVES.
11. VALVES SHALL HAVE A MINIMUM WORKING PRESSURE OF 150 PSI.
12. VALVES SHALL OPEN COUNTERCLOCKWISE.
13. INLET FLANGES SHALL BE CLASS 125, ANSI B16.1, OR ANSI/AWWA C110/A21.10.
14. OUTLET CONNECTION: STANDARDIZED MECHANICAL JOINT.
15. STEM SEALS: O RING.
16. STEM CONSTRUCTION: NON-RISING.
17. SEATING: PARALLEL SEAT
18. END CONNECTIONS: MECHANICAL ON RUN, FLANGED ON BRANCH.
19. BURIED TAPPING VALVES SHALL BE PROVIDED WITH A 2 INCH SQUARE WRENCH NUT AND CAST IRON VALVE BOX. IF DEPTH FROM GRADE TO TOP OF VALVE OPERATING NUT IS GREATER THAN 6'-0" , A VALVE STEM RISER MADE OF HIGH STRENGTH STEEL SHALL BE PROVIDED. DEPTH FROM VALVE STEM RISER NUT TO GRADE WILL BE 4 TO 6 FEET.

TAPPING SLEEVES

1. AWWA C509, LATEST REVISION.
2. AWWA C207, CLASS D, MAX. WORKING PRESSURE OF 150 PSI.
3. SLEEVES: SPLIT SLEEVES OF CAST IRON OR DUCTILE IRON.
4. MECHANICAL JOINT ENDS WITH END AND GASKET SEALS.
5. INLET FLANGES SHALL BE CLASS 125, ANSI B16.1, OR ANSI/AWWA C110/A21.10.
6. BOLTS AND NUTS, MECHANICAL JOINTS: HIGH STRENGTH CAST IRON OR HIGH STRENGTH LOW ALLOY STEEL, ANSI/AWWA C111/A21.11-90.
7. BOLTS AND NUTS, FLANGED JOINTS: HIGH STRENGTH, LOW CARBON STEEL CONFORMING TO ANSI/AWWA C110/A21.10-87, APPENDIX C.
8. COAT ALL NUTS AND BOLTS WITH A RUST RESISTANT LUBRICANT.
9. 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

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

CONCRETE

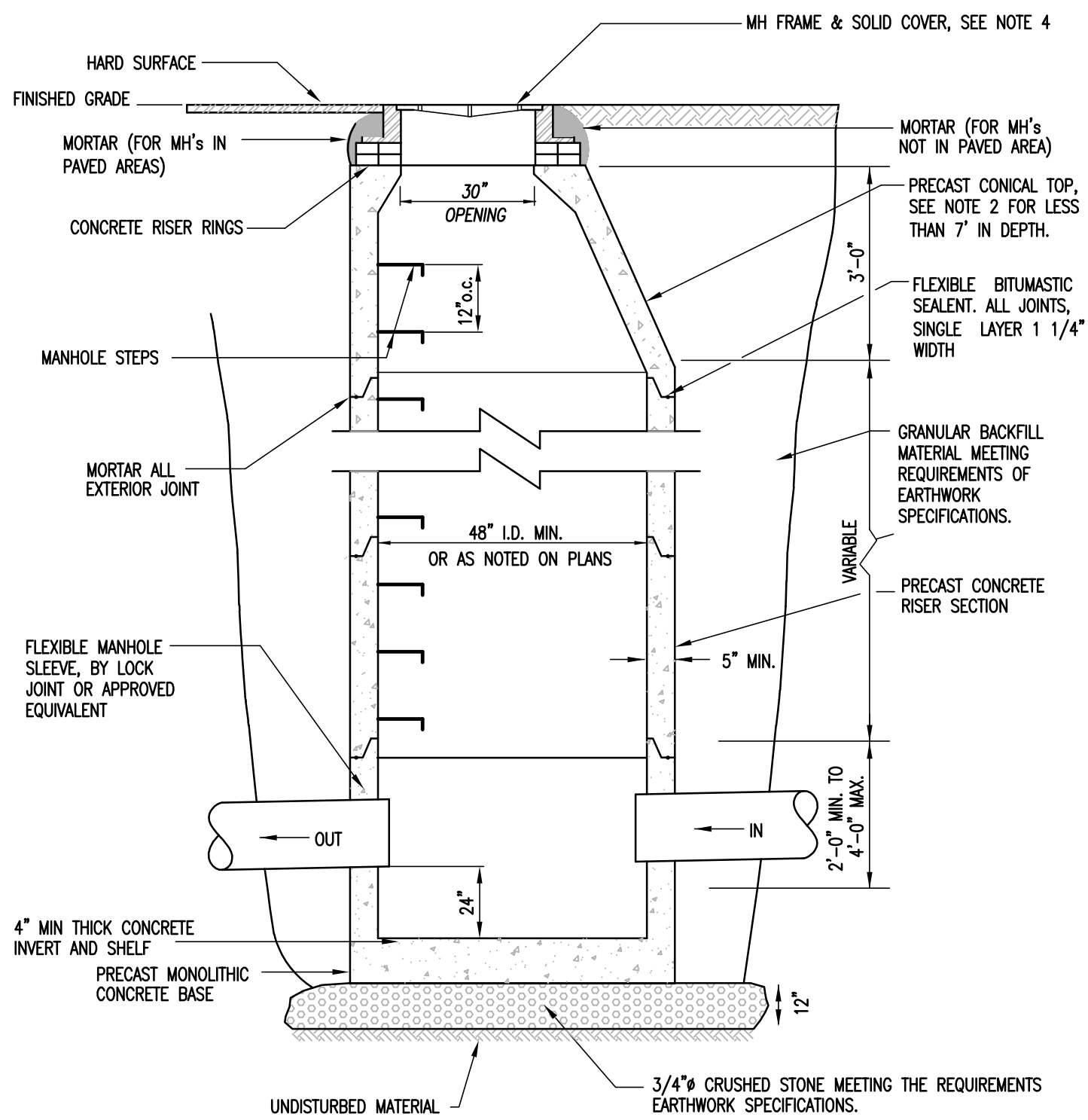
1. CONCRETE SHALL HAVE:
 - A. MIN. COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
 - B. AIR ENTRAINMENT OF 4% TO 6% BY VOLUME.
 - C. WATER CEMENT RATIO OF 0.49 LBS. WATER/CEMENT.
 - D. SLUMP OF 2 TO 4 INCHES.
2. CONCRETE SHALL NOT BE PLACED WHEN AMBIENT TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT OR MORE THAN 90 DEGREES FAHRENHEIT.
3. CONCRETE SHALL NOT BE DROPPED MORE THAN SIX FEET INSIDE A FORM.
4. MAINTAIN TEMPERATURE OF CONCRETE SURFACE AT MINIMUM 50 DEGREES FAHRENHEIT FOR 72 HOURS AFTER PLACING CONCRETE. PREHEAT ALL ENCLOSURES FOR A MINIMUM OF 2 HOURS TO PROVIDE A MIN. SURFACE TEMPERATURE OF 45 DEGREES FAHRENHEIT. ALLOW TO SET AND CURE ALL THRUST BLOCKS, CONCRETE SUPPORTS, AND ANCHORS A MINIMUM OF 24 HOURS BEFORE BACKFILLING.
5. COMPLETELY CURE AND SET CONCRETE BEFORE ANY HYDROSTATIC OR LEAKAGE TESTING OF PIPELINE SYSTEMS.
6. NONSHRINK GROUT SHALL BE HALCO TRADEMARK, AS MANUFACTURED BY LEHN & FINK INDUSTRIAL PRODUCTS.
7. DO NOT PLACE ANY MORTAR OR GROUT WHEN AMBIENT TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT.
8. MORTAR FOR MANHOLES SHALL CONSIST OF THE FOLLOWING:
 - A. CEMENT-TYPE II, ASTM C150.
 - B. HYDRATED LIME-TYPE II, ASTM C207.
 - C. SAND- ASTM C 33, FINE AGGREGATES FOR CONCRETE.
 - D. WATER-CLEAN, SUITABLE FOR DRINKING.

GENERAL

1. BEFORE ANY WATER LINE WORK IS COMMENCED BY THE CONTRACTOR, HE SHALL NOTIFY THE WATER
2. "AS BUILT" DRAWINGS SHALL BE PREPARED BY THE CONTRACTOR AT THE TIME OF COMPLETION OF THE SYSTEM.

ISSUED FOR
PERMIT REVIEW
12/06/16

Stamp	
Chkd.	
Description	
Rev.	No.
Client: Unsworth Properties, LLC 26 Railroad Avenue East (602) 879-4504	
Sheet Title: Water & Sewer Details	Project Title: The Vaults Redevelopment Project Pine Street & Howard Street Burlington, Vermont
Designed By: KW/HKW	Checked By: KW
Drawn By: HKW	Scale: NOT TO SCALE
Date: 12/06/16	
C2.1 EV#16414	

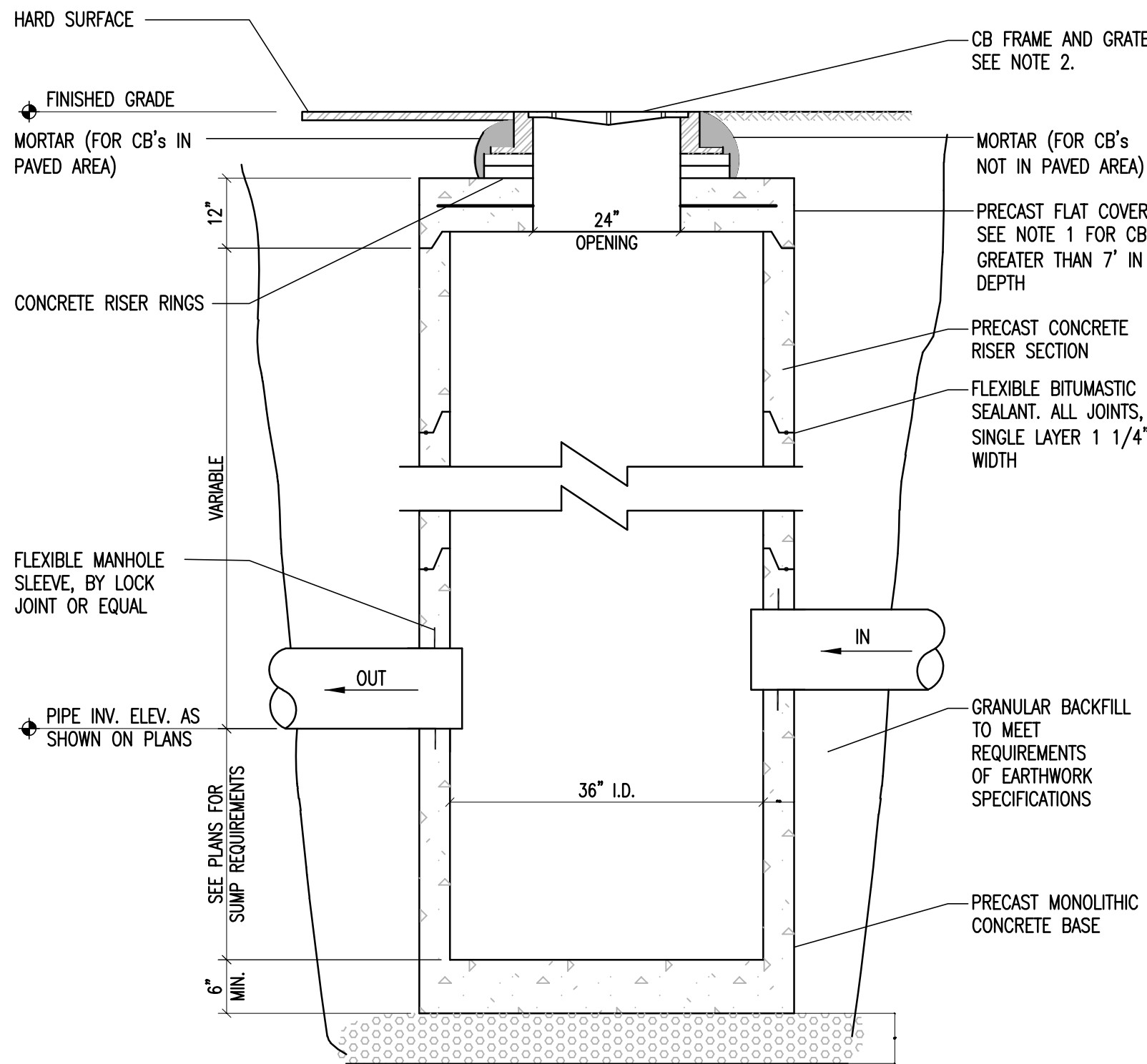


STORM MANHOLE NOTES

1. PROVIDE SMOOTH SWEEPING TRANSITIONS BETWEEN INVERTS OF INTERSECTING PIPE.
2. IF DEPTH OF MANHOLE IS 7 FT. OR LESS FROM RIM TO CENTERLINE INVERT, THEN A FLAT TOP WILL BE INSTALLED. IF DEPTH OF MANHOLE FROM RIM TO CENTERLINE INVERT IS MORE THAN 7 FT., THEN A CONICAL TOP WILL BE INSTALLED.
3. MANHOLE AND COVER SHALL BE DESIGNED FOR H2O LOADING.
4. PROVIDE A NEEDHAM FOUNDRY R-1564 OR APPROVED EQUIVALENT, CAST THE WORD "STORM" IN TOP COVER.
5. MANHOLE SHALL BE PRECAST CONCRETE SUPPLIED BY AN APPROVED MANUFACTURER.

MANHOLE DETAIL

NOT TO SCALE

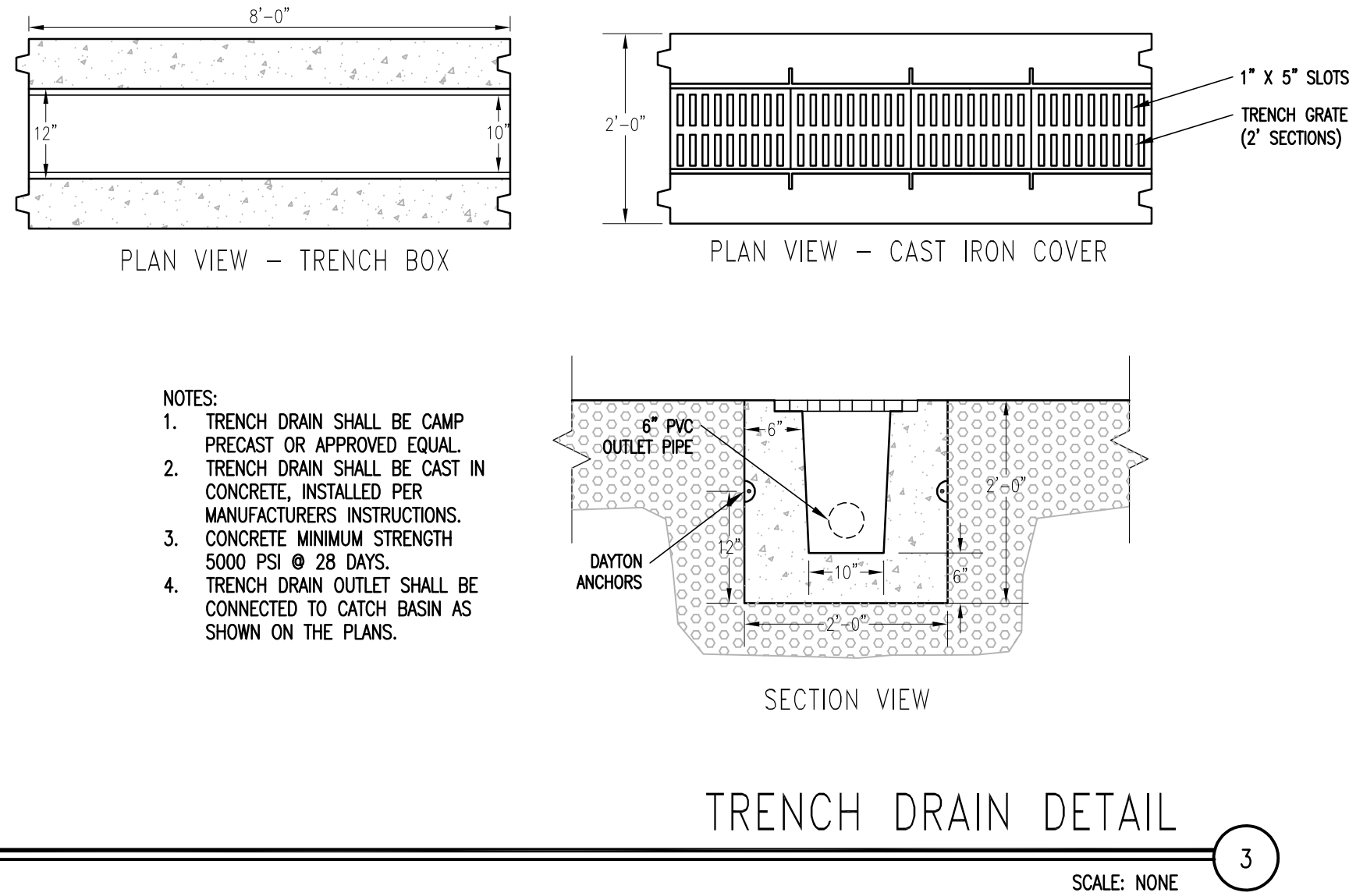


CATCH BASIN NOTES

1. IF DEPTH OF CATCH BASIN IS 7 FEET OR LESS FROM RIM TO CENTERLINE INVERT THEN A FLAT TOP WILL BE INSTALLED. IF DEPTH OF CATCH BASIN FROM RIM TO CENTERLINE INVERT IS MORE THAN 7 FEET THEN A CONICAL TOP WILL BE INSTALLED.
2. PROVIDE A LEBARON 24"x24" TYPE E OR APPROVED EQUIVALENT, 3 FLANGE GRATE AND FRAME NEXT TO CURBS AND 4 FLANGE GRATE AND FRAME AT ALL OTHER LOCATIONS.
3. CATCH BASIN AND GRATE SHALL BE DESIGNED FOR H2O LOADING.
4. CATCH BASIN SHALL BE PRECAST CONCRETE AS MANUFACTURED BY CAMP PRECAST, SD IRELAND OR APPROVED EQUIVALENT.

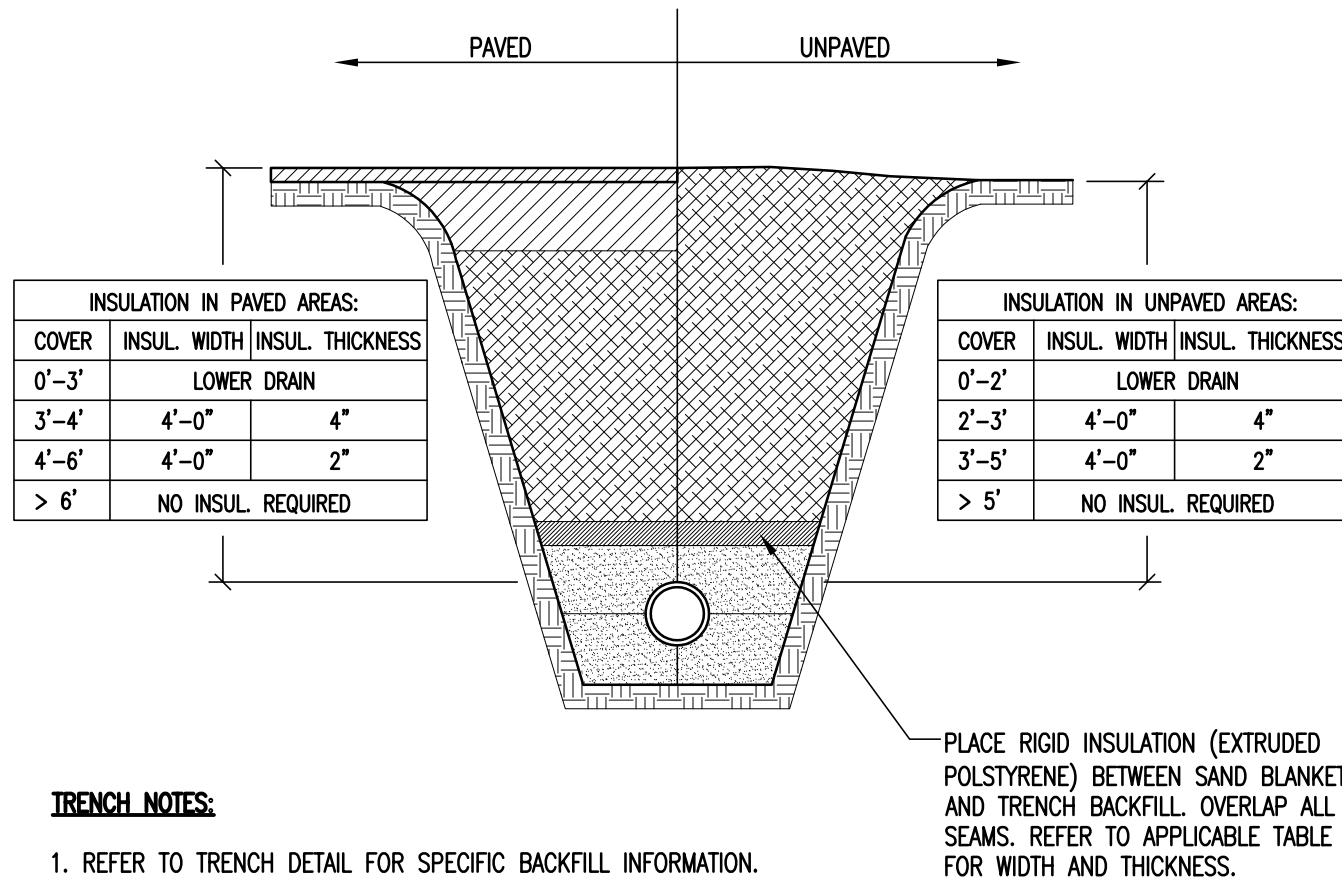
CATCH BASIN DETAIL

SCALE: NONE



TRENCH DRAIN DETAIL

SCALE: NONE

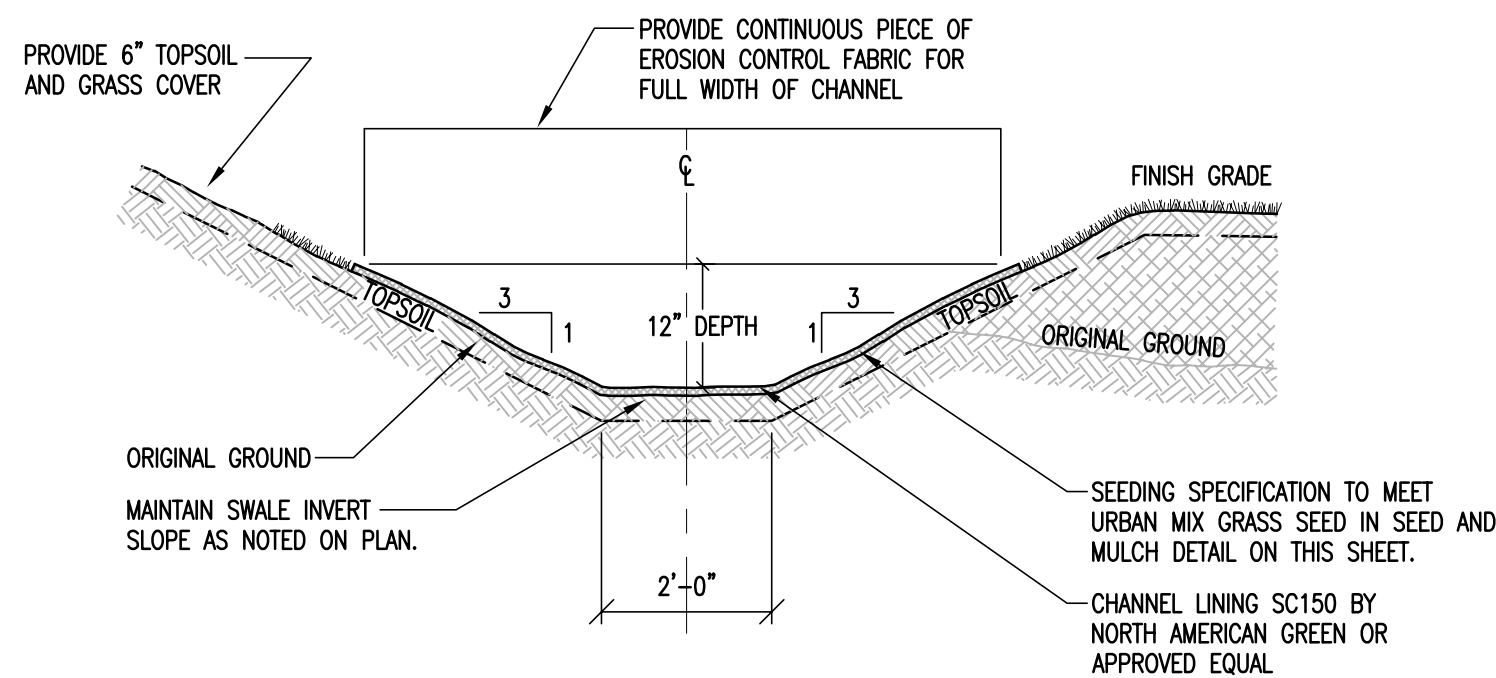


TRENCH NOTES:

1. REFER TO TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION.

INSULATION OVER SHALLOW STORM LINE DETAIL

NOT TO SCALE

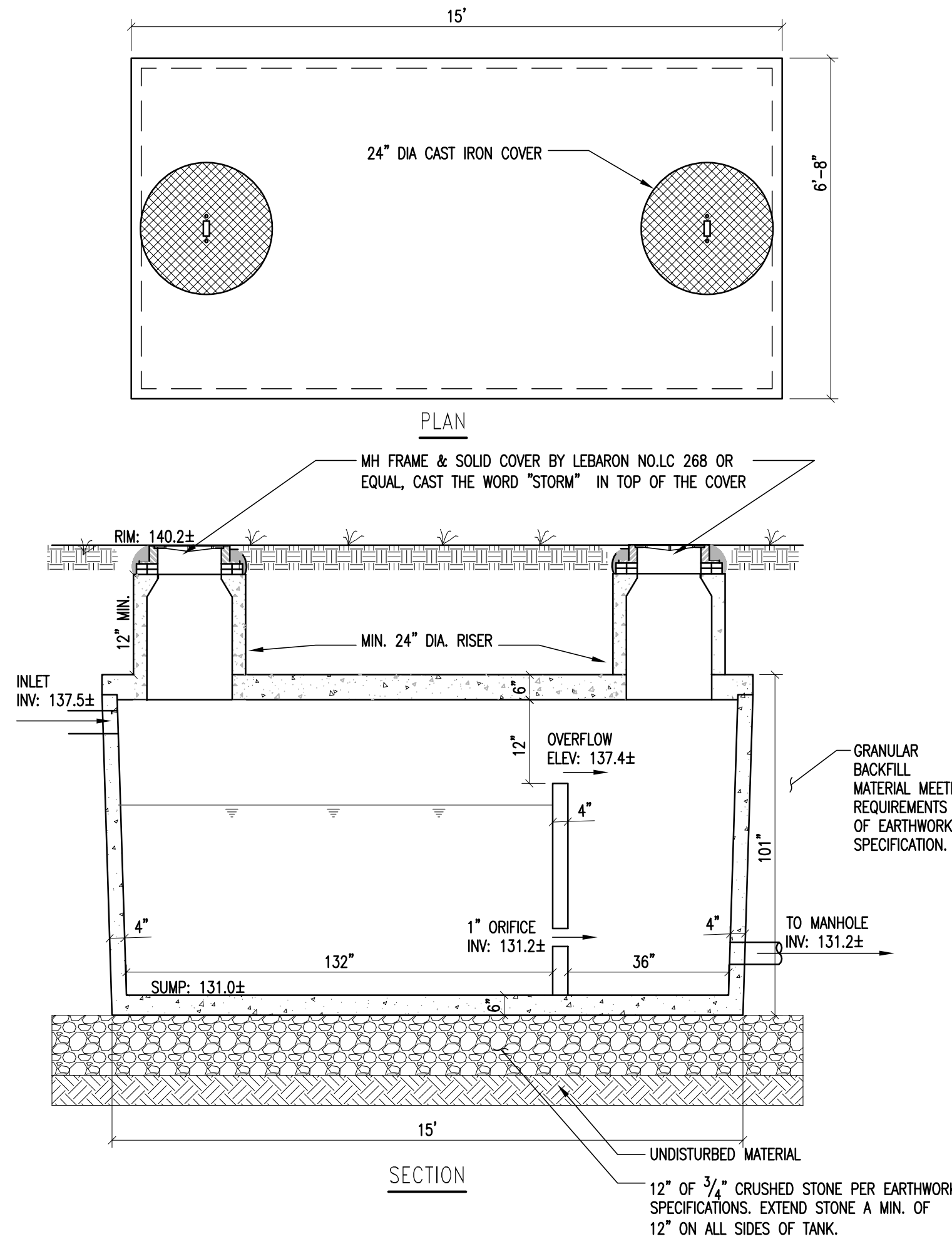


GRASSED WATERWAYS NOTES:

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE WATERWAY.
2. THE WATERWAY SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN, AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
3. FILLS SHALL BE COMPACTED AS NEEDED TO PREVENT UNEQUAL SETTLEMENT THAT WOULD CAUSE DAMAGE IN THE COMPLETE WATERWAY.
4. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE SPREAD OR DISPOSED OF SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE WATERWAY.
5. STABILIZATION SHALL BE DONE ACCORDING TO THE APPROPRIATE STANDARD AND SPECIFICATIONS FOR VEGETATIVE PRACTICES.

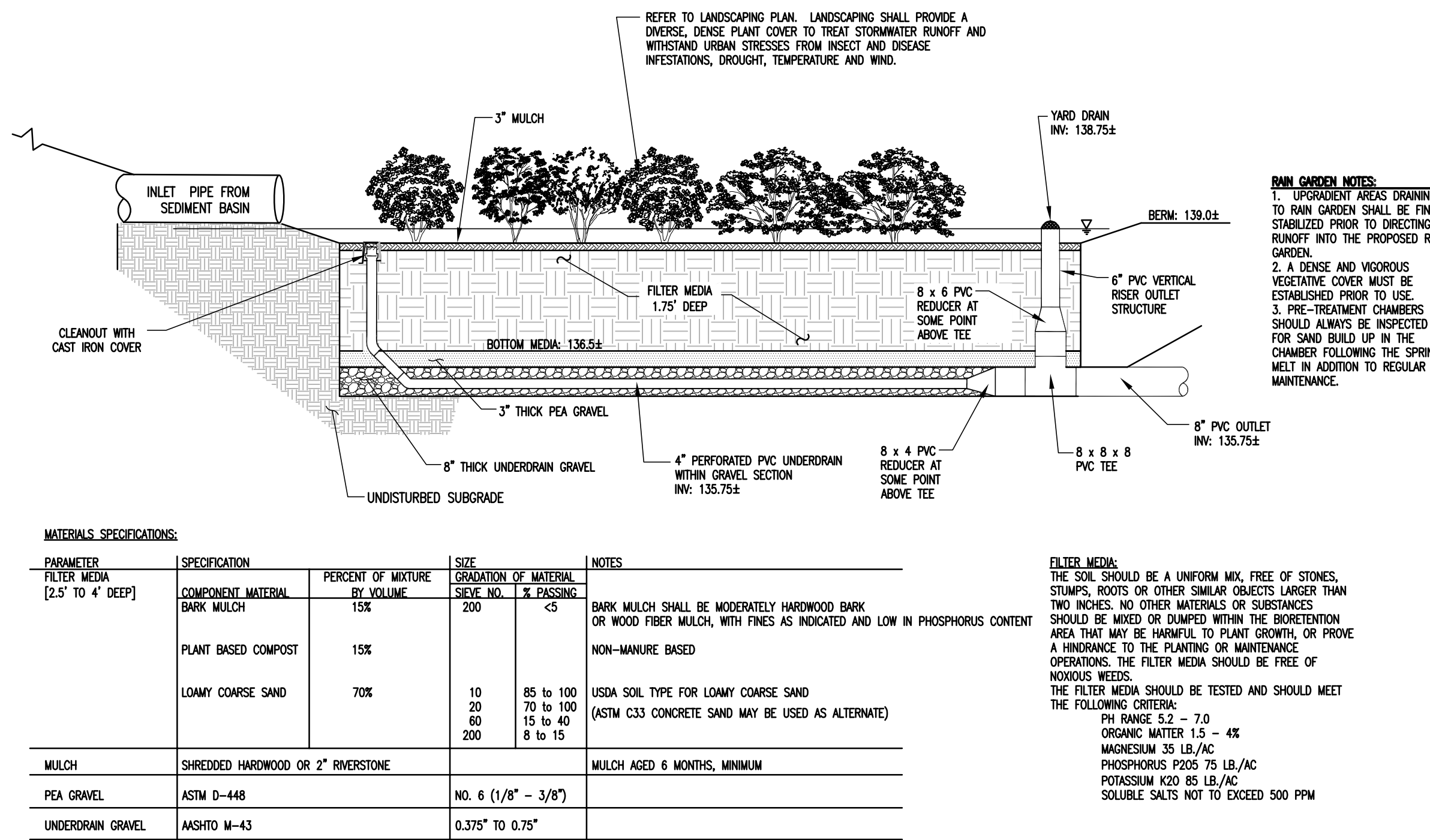
GRASSED LINED SWALE DETAIL

NOT TO SCALE



DETENTION TANK DETAIL

NOT TO SCALE



- RAIN GARDEN NOTES:**
1. UPSTREAM AREAS DRAINING TO RAIN GARDEN SHALL BE FINAL STABILIZED PRIOR TO DIRECTING RUNOFF INTO THE PROPOSED RAIN GARDEN.
 2. A DENSE AND VIGOROUS VEGETATIVE COVER MUST BE ESTABLISHED PRIOR TO USE.
 3. PRE-TREATMENT CHAMBERS SHOULD ALWAYS BE INSPECTED FOR SAND BUILD UP IN THE CHAMBER FOLLOWING THE SPRING MEET IN ADDITION TO REGULAR MAINTENANCE.

FILTER MEDIA:
THE SOIL SHOULD BE A UNIFORM MIX, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS OR SUBSTANCES SHOULD BE MIXED OR DUMPED WITHIN THE BROKETENTION AREA THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE. OPERATIONS. THE FILTER MEDIA SHOULD BE FREE OF NOXIOUS WEEDS.
THE FILTER MEDIA SHOULD BE TESTED AND SHOULD MEET THE FOLLOWING CRITERIA:
PH RANGE 5.2 - 7.0
ORGANIC MATTER 1.5 - 4%
MAGNESIUM 35 LB./AC
PHOSPHORUS P205 75 LB./AC
POTASSIUM K2O 85 LB./AC
SOLUBLE SALTS NOT TO EXCEED 500 PPM

RAIN GARDEN DETAIL

NOT TO SCALE

ISSUED FOR
PERMIT REVIEW
12/06/16

Stamp

Chkd. KW

Description

Rev. No. 1

STORMWATER DESIGN FOR REVIEW BY CITY

ENGINEERING VENTURES PC

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Sheet Title:

Stormwater Details

Project Title:

The Vaults Redevelopment Project

Pine Street & Howard Street

Burlington, Vermont

Designed By:

Checked By:

Drawn By:

Scale:

Date:

KW/HKW

KW

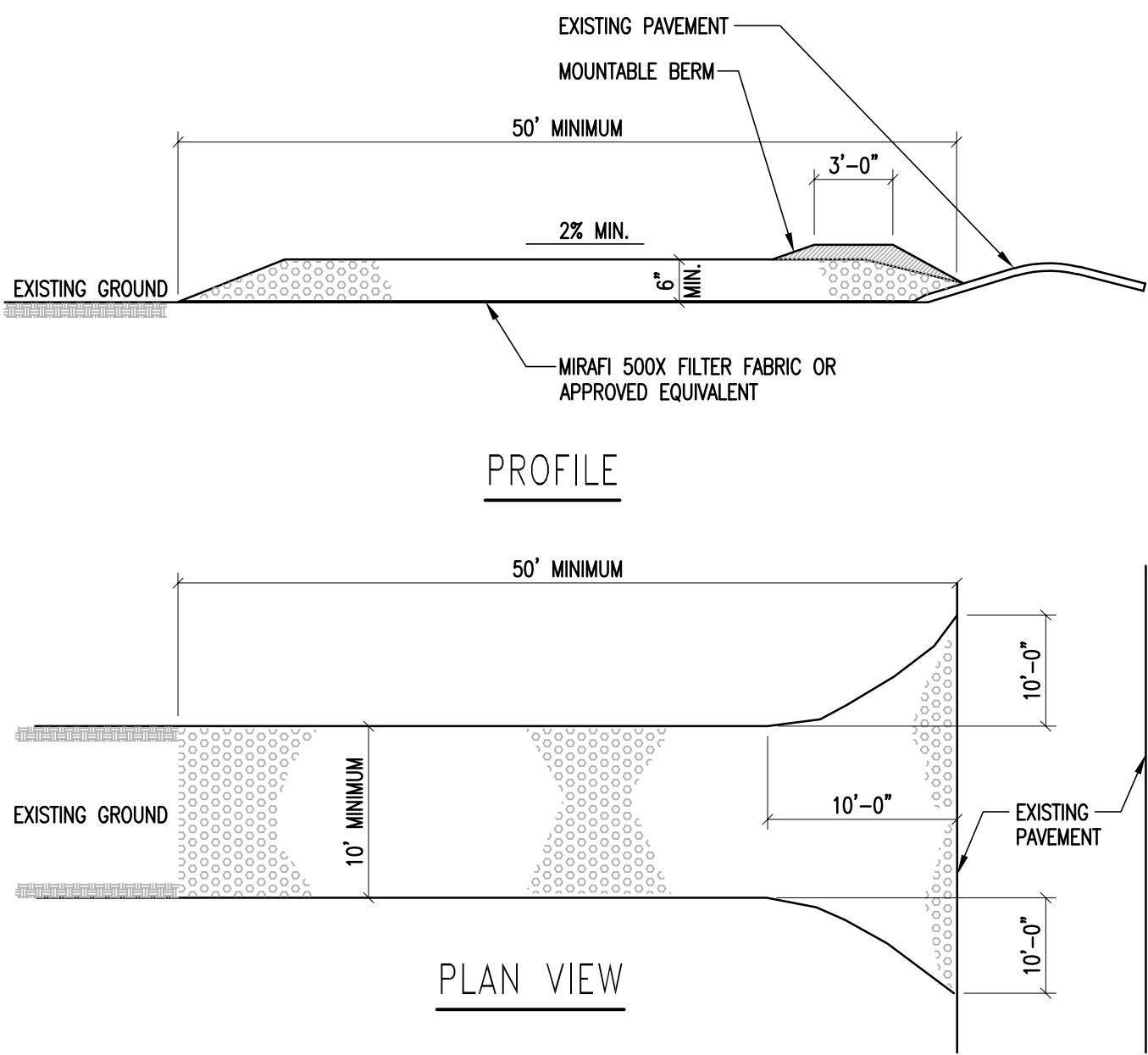
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12/06/16

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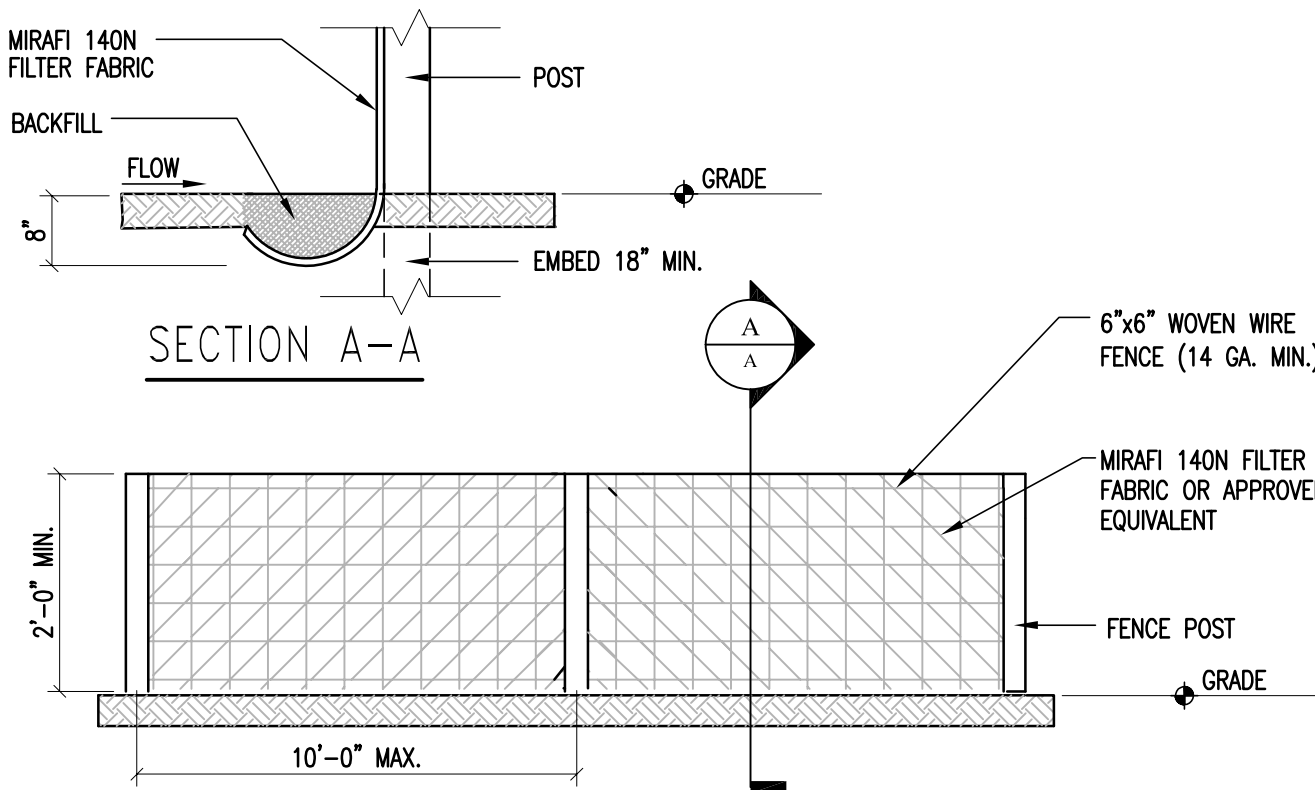


STABILIZED CONSTRUCTION ENTRANCE NOTES:

- STONE SIZE: USE TYPE 1 STONE-SITE/EARTHWORK SPECIFICATIONS.
- SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED ACROSS THE ENTRANCE.
- 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.
- PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
- 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.

STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE

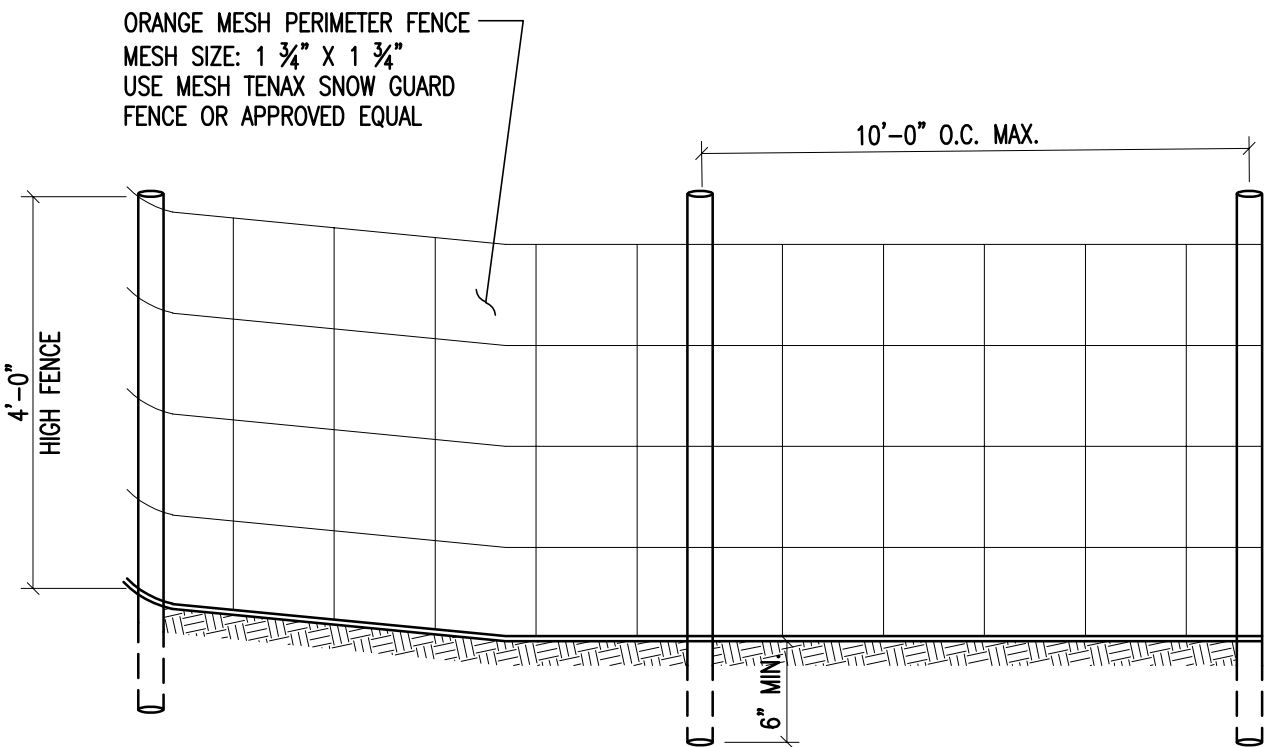


SILT FENCE NOTES:

- SILT FENCE SHALL BE PRE-FABRICATED EROSION CONTROL FENCE BY MIRAFI OR APPROVED EQUIVALENT, OR CONSTRUCTED IN PLACE AS SPECIFIED HEREIN.
- CONSTRUCTED IN PLACE SILT FENCE:
 - WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
 - FILTER FABRIC TO BE FASTENED SECURELY TO WOVEN WIRE FENCE TIES SPACED EVERY 24" AT TOP OF MID SECTION.
 - WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6", FOLDED AND STAPLED.
- 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.

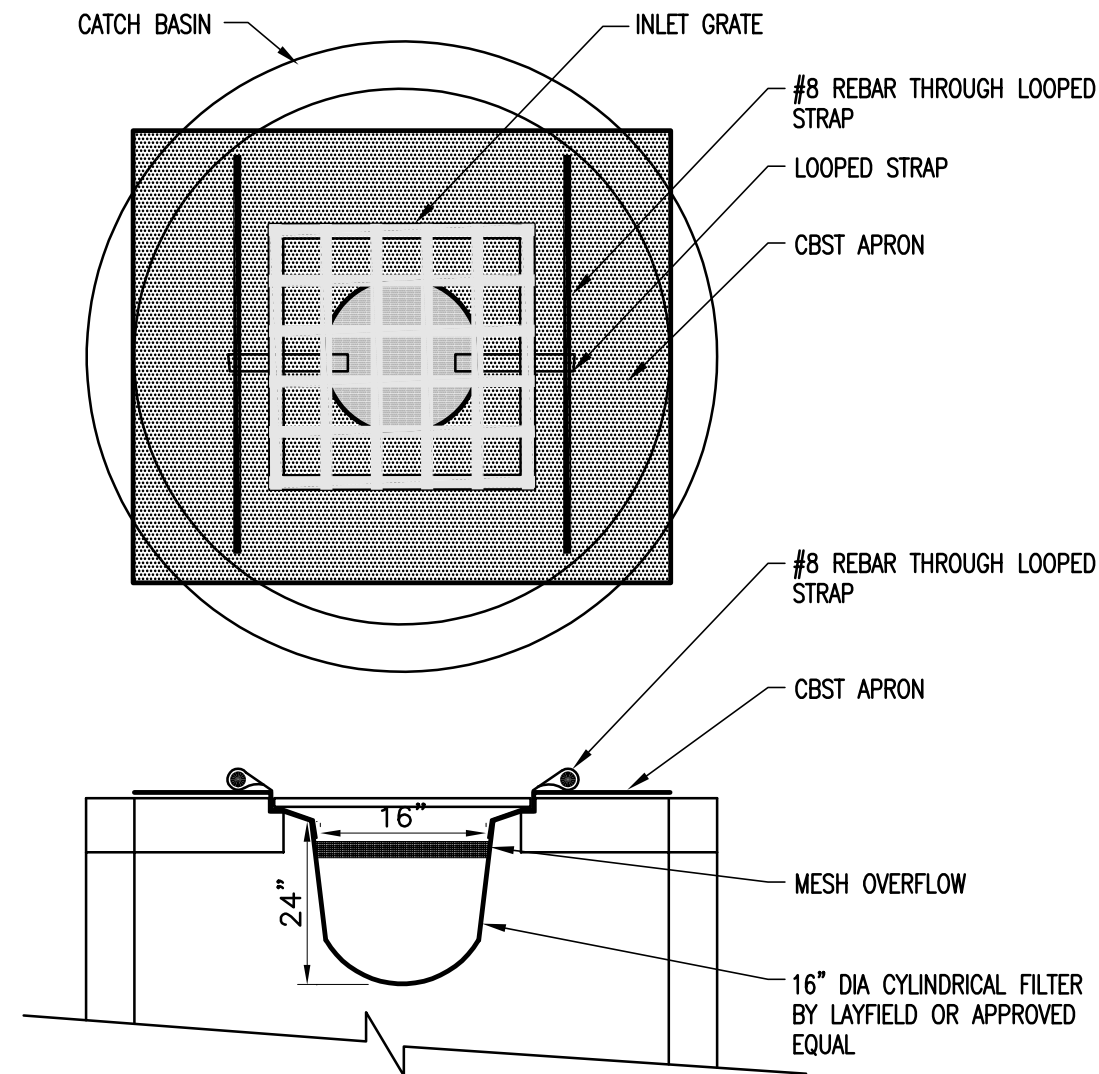
SILT FENCE DETAIL

NOT TO SCALE



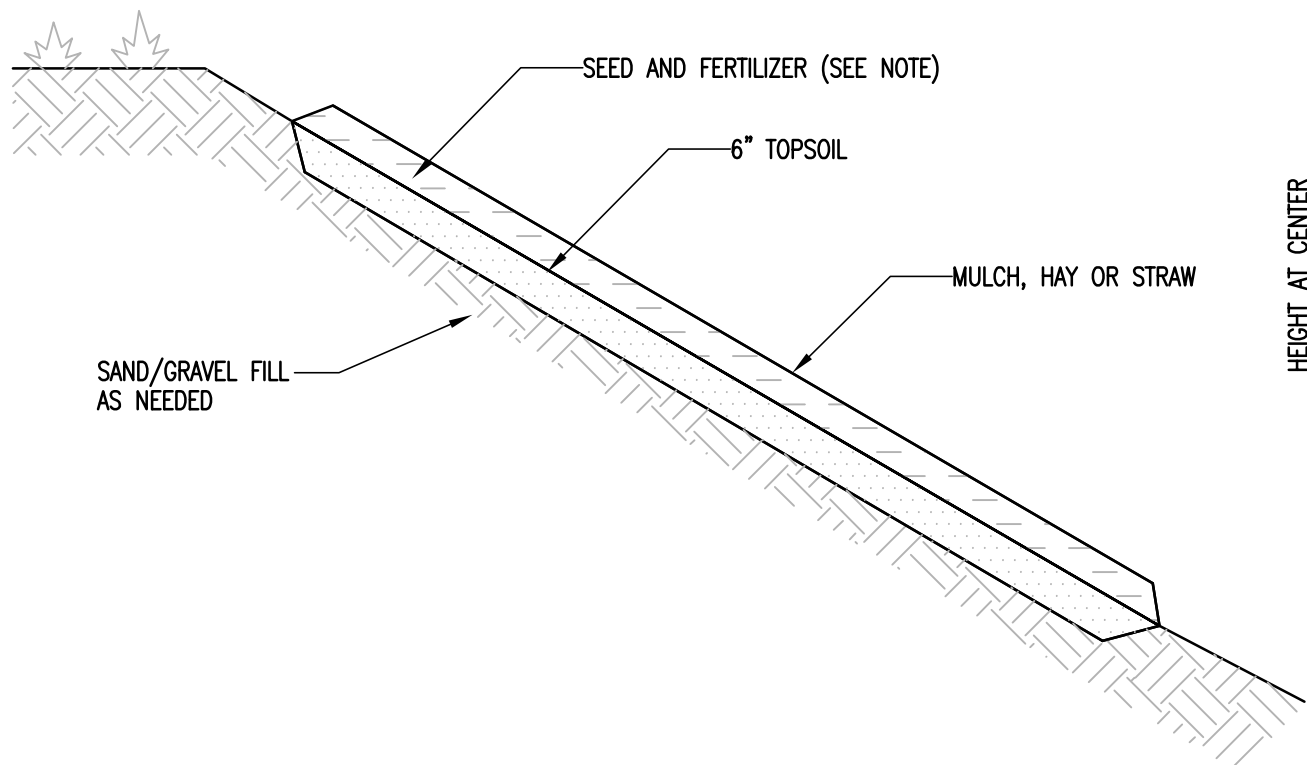
ORANGE CONSTRUCTION FENCE DETAIL

NOT TO SCALE



FABRIC INLET PROTECTION

SCALE: NONE



SEED AND MULCH NOTES:

- MULCH: HAY OR STRAW MAY BE UTILIZED AND SHALL BE APPLIED AT A RATE OF 2 TONS PER ACRE.
- SEED: SHALL BE OF THE FOLLOWING MIXTURE
 - KENTUCKY BLUE GRASS -----20 POUNDS / ACRE
 - CREeping RED FESCUE -----20 POUNDS / ACRE
 - RYE GRASS -----5 POUNDS / ACRE
- COVER SEED WITH 1/4 INCH SOIL UNLESS A HYDROSEEDER IS USED.
- MULCH ANCHORING: SHALL BE ACCOMPLISHED BY DEGRADABLE MULCH NETTING. USE WHEN SLOPES ARE GREATER THAN 10%.
- TOPSOIL AND MULCHING NOT TO BE APPLIED IN AREAS OF TRAVEL WAYS.
- SEEDING AND MULCHING OF DISTURBED AREAS SHALL TAKE PLACE WITHIN 48 HOURS OF FINAL GRADING.

SEEDED AND MULCHED AREAS DETAIL

NOT TO SCALE

URBAN MIX GRASS SEED- FOR USE IN GRASSSED LAWN AREAS AROUND BUILDING AND PARKING		
% BY WEIGHT	LBS. LIVE SEED BY ACRE	TYPE OF SEED
37.5	45.0	CREeping RED FESCUE
31.25	37.5	KENTUCKY BLUEGRASS
31.25	37.5	WINTER HARDY, PERENNIAL RYE
100	120.0 # LIVE SEED/ ACRE	

CONSERVATION MIX GRASS SEED- FOR USE IN ALL OTHER AREAS		
% BY WEIGHT	LBS. LIVE SEED PER ACRE	TYPE OF SEED
35	77.0	CREeping RED FESCUE
20	44.0	KENTUCKY BLUE GRASS
15	33.0	CUTTER PERENNIAL RYE GRASS
15	33.0	ANNUAL RYE GRASS
10	22.0	TALL FESCUE
5	11.0	WHITE CLOVER
100	220.0 # LIVE SEED/ACRE	

FERTILIZER- 10 LBS. PER 1000S.F.
SPRING SEEDING
FALL SEEDING

LIME- 90 LBS. PER 1000S.F.
DOLOMITIC GROUND LIMESTONE
NOT LESS THAN 85% OF THE TOTAL CARBONATE

TOP SOIL
6" MINIMUM APPROVED TOPSOIL

STRAW MULCH- 2 BALES PER 1000S.F.
APPLY BINDER OR NETTING AS NEEDED

SEED SPECIFICATION

NOT TO SCALE

EROSION CONTROL NOTES

- THE "ON-SITE EROSION CONTROL PLAN COORDINATOR" SHALL BE PRESENT ON-SITE FROM DAY-TO-DAY, AND SHALL BE RESPONSIBLE FOR ENSURING THAT THE EROSION CONTROL MEASURES REQUIRED BY THE EROSION CONTROL PLAN, DETAILS AND NOTES, ARE PROPERLY INSTALLED AND MAINTAINED. THE ON-SITE EROSION CONTROL PLAN COORDINATOR SHALL KEEP A WRITTEN RECORD OF INSPECTIONS AND MAINTENANCE OF EROSION CONTROL FEATURES. A COPY OF THESE PLANS AND INSPECTION/MAINTENANCE RECORDS SHALL BE KEPT ON-SITE AT ALL TIMES.
- THE CONTRACTOR SHALL NOTIFY THE OWNER AT LEAST 24-HOURS PRIOR TO ANY EARTH DISTURBING ACTIVITIES AND SHALL POST THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN NOTICE IN FULL VIEW AT ALL TIMES DURING EARTH DISTURBANCE.
- DISTURBANCE LIMITS ARE TO BE MARKED, AND THE FOLLOWING MANAGEMENT PRACTICES INSTALLED, PRIOR TO BEGINNING EARTHWORK IN ANY GIVEN AREA: SILT FENCE, CONSTRUCTION ENTRANCE, INLET PROTECTION & TREE PROTECTION FENCING.
- ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE "VERMONT DEC LOW RISK SITE HANDBOOK FOR EROSION PREVENTION & SEDIMENT CONTROL", DATED 2006.
- DURING THE NON-WINTER CONSTRUCTION SEASON, 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:
 - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN 24 HOURS AND NO PRECIPITATION IS FORECAST DURING THAT PERIOD.
 - WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2- FEET OR MORE IN DEPTH.
- THE PERIOD BETWEEN NOVEMBER 1ST AND APRIL 15TH IS CONSIDERED THE "WINTER CONSTRUCTION PERIOD". IF SOILS WILL BE EXPOSED AFTER NOVEMBER 1ST, A PLAN FOR WINTER CONSTRUCTION MUST BE DEVELOPED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER ON OR BEFORE OCTOBER 1ST. THE CONTRACTOR SHALL ENSURE SEDIMENT CONTROL IS INSTALLED PRIOR TO THE SOIL FREEZING. AN INSPECTION WILL BE REQUIRED IF THE PROJECT IS COMPLETED DURING THE WINTER MONTHS TO ENSURE THE SITE IS SECURED FOR THE REMAINDER OF THE SEASON.
- DURING THE WINTER CONSTRUCTION SEASON, ANY NEW DISTURBANCE MUST BE STABILIZED (TEMPORARY OR FINAL) AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
 - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN 24 HOURS AND NO PRECIPITATION IS FORECAST DURING THAT PERIOD.
 - WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2- FEET OR MORE IN DEPTH.
- IN NO CASE SHALL SOIL BE EXPOSED FOR MORE THAN 14 DAY WITHOUT BEING STABILIZED.
- ALL DISTURBED AREAS ARE TO BE PERMANENTLY STABILIZED WITHIN 48 HOURS OF FINAL GRADING.
- THE PERIMETER OF THE SITE AND ALL Bmps SHALL BE INSPECTED AT THE END OF EACH WORK DAY TO ENSURE SEDIMENT DOES NOT LEAVE THE SITE. IF SEDIMENT HAS TRAVELED BEYOND THE PROJECT LIMITS, IT SHALL BE RELOCATED IN AN UPGRADE AREA ON SITE AT THE END OF EACH WORK DAY.
- ALL STABILIZATION INVOLVING SEEDING IS TO BE COMPLETED BY SEPTEMBER 15TH.
- THE CONTRACTOR SHALL BE 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.
- IF DEWATERING IS REQUIRED FOR CONSTRUCTION, THE CONTRACTOR MUST UTILIZE SEDIMENT FILTER BAGS (OR ALTERNATE APPROVED BY THE ENGINEER) TO PREVENT DISCHARGE OF SEDIMENT-LADEN WATER OFF SITE.
- EXCAVATED MATERIAL FROM EARTH EXCAVATION AND DITCH DIGGING SHALL BE PLACED ON-SITE IN A LOCATION TO BE APPROVED OF BY THE OWNER AND/OR THE ENGINEER OR USED FOR PROJECT FILL MATERIAL IF DETERMINED SUITABLE BY THE OWNER'S REPRESENTATIVE.
- STOCKPILED MATERIAL (TOPSOIL, BORROW, ETC.) SHALL HAVE SILT FENCE CONSTRUCTED AROUND THE PERIMETER. THE STOCKPILED MATERIAL SHALL BE SEEDED AND MULCHED AS SOON AS POSSIBLE TO PREVENT SOIL EROSION AND SEDIMENTATION OFF SITE. LOCATE STOCKPILES ON THE UPHILL SIDE OF DISTURBED AREAS, IF POSSIBLE. DURING WINDY CONDITIONS, STOCKPILED MATERIAL SHALL BE COVERED OR WATERED APPROPRIATELY TO PREVENT WIND EROSION.
- SLOPES GREATER THAN 3:1 SHALL HAVE EROSION CONTROL NETTING INSTALLED TO STABILIZE THE SLOPE AND REDUCE THE EROSION POTENTIAL. NETTING SHALL BE BIODEGRADABLE WITH A 12 MONTH LONGEVITY, S150BN AS MANUFACTURED OR APPROVED EQUIVALENT. INSTALL NETTING OVER MULCHED SLOPES SO THAT ALL PARTS ARE IN CONTACT WITH THE SOIL AND MULCH. PIN NETTING WITH WIRE STAPLES 3 FEET O.C. TO ENSURE FULL BONDING WITH SOIL SURFACE. THE SLOPE SURFACES SHOULD BE LEFT SLIGHTLY ROUGHENED AND NOT SMOOTH. IF LARGE AMOUNTS OF OFFSITE WATER WILL DRAIN OVER THESE SLOPES, TEMPORARY DIVERSION SWALES SHALL BE INSTALLED UP SLOPE UNTIL THE SLOPE VEGETATION STABILIZES.
- THE OWNER SHALL BE NOTIFIED WHEN SITE WORK IS COMPLETED AND THE SITE IS STABILIZED. THE OWNER WILL COORDINATE WITH BURLINGTON DPW TO SCHEDULE A STABILIZATION INSPECTION.

Stamp

Chkd.

Description

Rev. No.

ENGINEERING
VENTURES PC

208 Flynn Avenue, Suite 2A Burlington, VT 05401
Tel: 802.863.6225 • Fax: 802.863.6306
85 Mechanic Street, Suite 304A, Lebanon, NH 03766
Tel: 603.942.5333 • Fax: 603.942.5331
www.engineeringventurespc.com

Client:

Unsworth Properties, LLC
26 Railroad Avenue
East
(802) 879-4504

Sheet Title:

Erosion Prevention &
Sediment Control Details
Project Title: The Vaults Redevelopment Project
Pine Street & Howard Street
Burlington, Vermont

Designed By: KW/HKW

Checked By: KW

Drawn By: HKW

Scale: NOT TO SCALE

Date: 12/06/16

ISSUED FOR
PERMIT REVIEW
12/06/16

C2.3
EV#16414



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 400 Pine Street & 30-32 Howard Street
2. Zoning Permit Address (if different from above): _____
3. Brief Project Description (i.e. building construction, subdivision, site work)
Demolition of (3) existing structures, merger of the two lots and construction of a (3) story mixed use building with a additional level for underground parking.
4. Owner Name: Howard Space Partnership LLP (Unsworth Properties, James Unsworth)
5. Owner Mailing Address: 26 Railroad Avenue, Essex Junction, VT 05452
6. Owner Phone: (802) 879-4504 6. Owner email: james@unsworthproperties.com
7. Contractor Name: _____ ☒ Contractor not known at this time
8. Contractor Phone: _____ 9. Contractor Email: _____
10. Estimated Project Start Date _____ Estimated End Date _____
11. Area of Land Disturbance 24,677 sq. ft.
12. Total proposed (existing + new) amount of impervious: 18,696 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.

- 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:

- o sediment does not enter surface water bodies (streams, ditches, ponds, lakes, wetlands etc.)
- o sediment does not enter City conveyance infrastructure (catch basins, sewers etc.) and
- o 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:
- o 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
 - o 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:
- o 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
 - o 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

Name

Signature

Date

Additional Conditions of Approval:

AN EROSION PREVENTION AND SEDIMENT CONTROL PLAN

FOR THE PROJECT AT:

HAS BEEN FILED WITH THE CITY OF BURLINGTON
STORMWATER MANAGEMENT PROGRAM IN ACCORDANCE
WITH CHAPTER 26 OF THE BURLINGTON CODE OF ORDINANCES

THIS REQUIRES THAT MEASURES BE INSTALLED OR TAKEN TO
PREVENT SEDIMENT FROM LEAVING THE SITE AND ENTERING
WATERWAYS AND IMPACTING CITY INFRASTRUCTURE
(RIGHT OF WAY AND STORMDRAINS)

FOR QUESTIONS OR TO REPORT SEDIMENT LEAVING THE SITE
CALL 802-863-4501

This notice to be posted in full view at all times during earth
disturbance. Additional conditions on attached.

Plan Approved by: _____ Date: _____
Burlington Stormwater Program

TYPICAL SOLUTIONS TO PREVENT OR CONTROL SEDIMENT AND EROSION

STOCKPILES

- Cover small stockpiles with a tarp when not being used.
- Install silt fencing or other appropriate devices around the stockpiles to filter sediment.
- Cover stockpiles with straw or other approved mulching material.
- Plan to remove any unusable material as soon as possible from the site to an approved location.
- Plant grass and mulch stockpiles that will be on site for more than 14 days.
- Cover, vegetate or install erosion matting on stockpiles that will remain disturbed over the winter.

DISTURBED AREAS

- Maintain vegetated buffers around disturbed areas.
- Install silt fencing or other appropriate device to filter sediment washing off from disturbed areas. Remember that the bottom of the silt fence must be “keyed in” (dug into ground) to work correctly.
- To prevent sediment from running off your site via your driveway (or other paved areas where you can’t install silt fence) use a row of hay bales or tube sand.
- Cover disturbed areas as soon as possible with straw or other approved mulching material. Use erosion control matting in high wind, traffic or slopes steeper than 3:1 (horizontal to vertical), and follow the manufacturer’s guidelines staple the matting down.
- Plant grass and mulch or use erosion control matting all disturbed areas that will remain exposed for more than 14 days.
- Cover, vegetate or install erosion matting on areas that will remain disturbed over the winter.
- Protect ditches, catch basins or water bodies off-site by using silt fencing, gravel check dams or other approved sediment control methods.

CONSTRUCTION VEHICLES

- Do not park construction vehicles on City owned green space. Vehicles disturb vegetation and compact the soil, thereby reducing its ability to infiltrate stormwater. Any green belt disturbance will need to be permanently stabilized with grass seed and erosion control matting.
- Prevent sediment from leaving the project by cleaning the tires of vehicles, or use clean gravel at project access points to clean tires.
- Sweep city streets, sidewalks and bikepaths daily or as needed to remove sediment transported from the project.

RESOURCES

The Vermont Handbook for Erosion Prevention and Sediment Control at:

http://vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf

The City of Burlington Stormwater Program Page at

<http://www.burlingtonvt.gov/DPW/Stormwater-Management>



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: [400 Pine Street & 30-32 Howard Street](#)
 - o Owner: [Howard Space Partnership, LLC](#)
 - o Engineer: [Kevin Worden, PE - Engineering Ventures, PC](#)
 - o Brief project description: [Demolition of \(3\) existing structures, merger of the two lots and construction of a \(3\) story mixed use building with a additional level for underground parking.](#)

- Stormwater Management Plan

- o Impervious¹ change summary

[Project Area = 18,529 s.f.](#)

Condition	Type	Total Impervious (s.f.)
Existing Conditions	Existing Impervious	14,740 s.f.
Proposed	Total Proposed (1+2+3)	13,015 s.f.
	1) New ²	1,857 s.f.
	2) Existing to Remain	608 s.f.
	3) Redeveloped	10,550 s.f.
Net New	Total Proposed – Existing	-1,725 s.f.

If available at this time:

- Existing conditions: *description of existing conditions, description of existing stormwater system, existing drainage issues, current connectivity to City system*

[On site stormwater discharges into the combined sewer system on Howard Street, which ultimately receives treatment at Burlington's Main Wastewater treatment plant.](#)

- 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)*

[A sediment basin in conjunction with a rain garden will be used for treatment of runoff from the eastern tandem parking area. Additionally, a stormwater detention tank is proposed to capture roof runoff to be released into the existing system at a slower rate. Deep sump catch basins will be installed to capture runoff from the portion of the access drive draining to the garage as well as snow-melt from parked vehicles.](#)

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

Stormwater Narrative

Project Description

The applicant, James Unsworth, proposes the demolition of three buildings to allow for construction of a three story mixed use building with an additional level of underground parking. The demolition will include two existing industrial buildings located at the southeast corner of the 400 Pine Street parcel, as well as the immediately adjacent duplex on the 30-32 Howard Street parcel. The 0.11-ac Howard Street parcel will be merged with the ±2.73-acre Pine Street parcel, both located in the light manufacturing enterprise zone on the boundary of the low density residential zone.

Existing Conditions

The site is located on the north side of Howard Street, 180-feet east of the Pine Street intersection. The portion of the site on the existing Pine Street parcel are nearly entirely impervious, while the existing duplex can be described as urban residential with an estimated even split of impervious surfaces and green space. Runoff from the site discharges into Burlington's combined sewer system via storm drains located on Pine Street and is ultimately treated at the Main Wastewater Treatment Plant. All soils on site are mapped by the Natural Resource Conservation Service as Hydrological Soil Group C. A test pit survey is scheduled to be performed to determine the specific soil profiles present on site.

Proposed Conditions

The three-story structure featuring an additional level of underground parking is proposed to accommodate artist studios on the first story, general office space on the second and third stories, and 25-parking spaces in the underground garage. Additionally, south end of the proposed structure abutting Howard Street will function as a duplex to replace the housing units eliminated from the 30-32 Howard Street Parcel. A driveway with space for 4-vehicles (two rows of two vehicles parked in tandem) is proposed as parking for the future residents. The proposed site layout will eliminate a total of 1,725-square feet of impervious surface.

Stormwater Management Methodology

For the purposes of analyzing this site, two (2) points of interest were established outside the perimeter of the project area. Existing and post development surface areas are shown on Exhibit A and Exhibit B, respectively. Exhibit C presents both existing and post-development conditions showing areas of existing impervious to remain, redeveloped impervious and new impervious surfaces. Proposed stormwater treatment devices were incorporated into the site design according to City of Burlington's 'Treatment/Runoff Reduction/Detention Requirements Based on Receiving Water' table, for sites discharging to the combined sewer system.

Point of Interest #1 (POI #1)

Point of Interest #1 has been established as the existing catch basin located north easterly of the project site. The existing area draining to this point is comprised of 3860-sf of impervious surface and 1129-sf of lawn area. The proposed post-development area draining to this point includes 308-sf of impervious surface and 3,484-sf of lawn area. Treatment is not proposed in this area, although with a 70% increase in green space, runoff infiltration will be increased as well as the potential for evapotranspiration.

Point of Interest #2

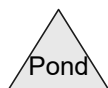
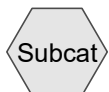
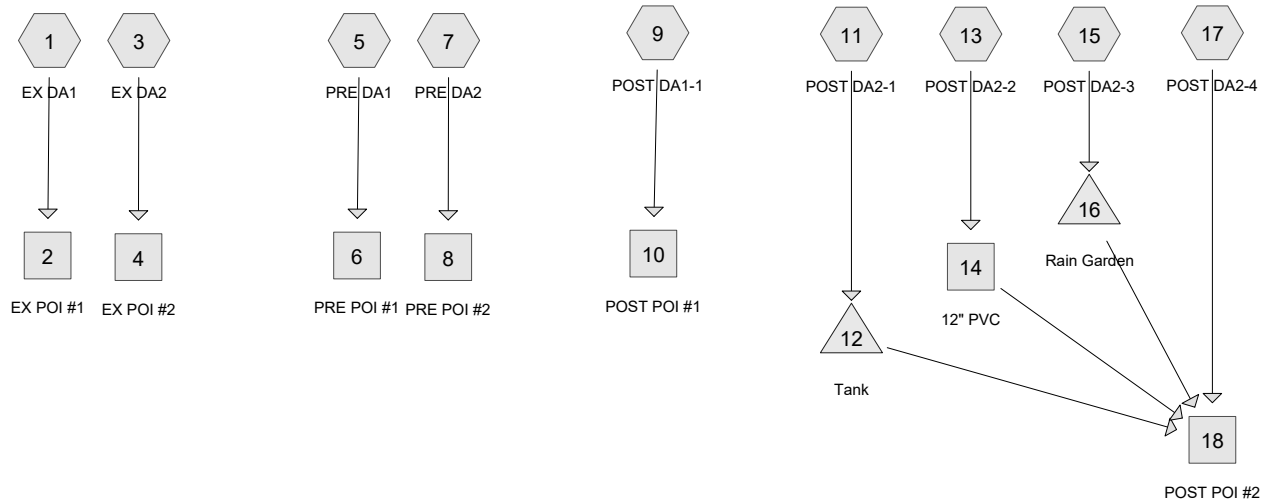
Point of Interest #2 has been established as a point within the City Right of Way off the southwest corner of the project area. Runoff discharges off site to this point, travels nearly 250-feet and is collected by an existing catch basin at the southeast corner of the intersection of Pine and Howard Street. The existing area draining to this point is comprised of 10880-sf of impervious surface and 2,660-sf of lawn area. The proposed post-development area draining to this point includes 12,703-sf of impervious surface and 2,034-sf of lawn area. A trench drain linked to a series of deep sump catch basins will be installed in the underground parking garage to maximize oil/grit removal from runoff draining down the access ramp and sediment tracked in by vehicles. Additionally, a tank has been designed to capture and detain runoff from the rooftop to reduce discharge rates to the City's combined sewer system during lower intensity storms. Finally, a sediment basin and rain garden are proposed at the south end of the proposed building to treat runoff from the south end of the project site.

Runoff curve numbers were determined and input into HydroCAD (ver. 10.00-14) while time of concentrations were assumed to be 5-minutes (due to the large percentage of impervious) for existing conditions, pre-development conditions and post-development conditions. Pre-development conditions models half of all existing impervious plus all existing lawn areas as meadow in meeting the City's goal of emulating flows as if half the project site were never developed. The peak rates (cubic feet per second) calculated for existing, pre-development and post-development conditions to POI #1 and POI#2 for the 1-year storm are as follows:

Peak Flow Rates for 1-year Storm Event			
	POI #1	POI #2	SITE TOTAL
Existing Conditions	0.26-cfs	0.70-cfs	0.96-cfs
Pre-Development	0.12-cfs	0.35-cfs	0.47-cfs
Post-Development	0.06-cfs	0.32-cfs	0.38-cfs

Conclusions to Stormwater Management Analysis

The development shows a significant decrease in runoff rate and volume for the 1-year storm event not only between existing conditions and post-development conditions, but between pre-development conditions and post-development conditions.



Routing Diagram for 16414-hydrocad-CURRENT
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16414-hydrocad-CURRENT

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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 1: EX DA1

Runoff = 0.26 cfs @ 11.96 hrs, Volume= 0.012 af, Depth> 1.26"

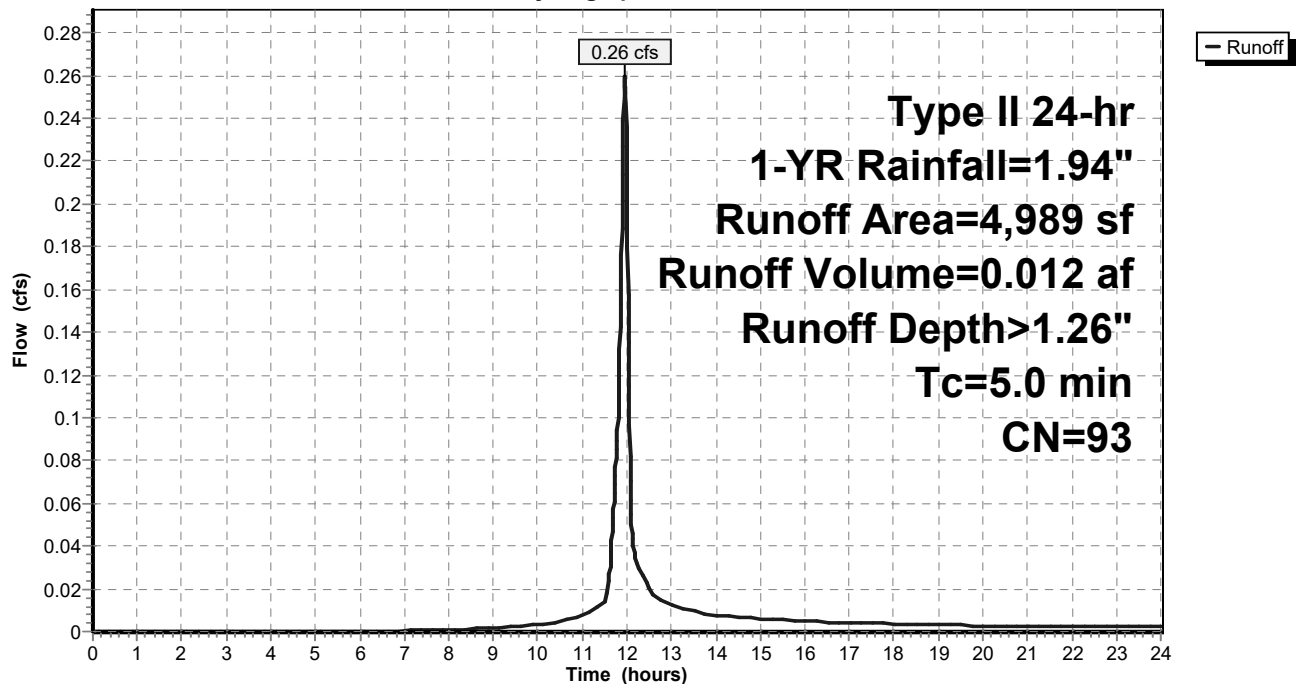
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	3,860	98	Impervious
	1,129	74	>75% Grass cover, Good, HSG C
	4,989	93	Weighted Average
	1,129		22.63% Pervious Area
	3,860		77.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 1: EX DA1

Hydrograph



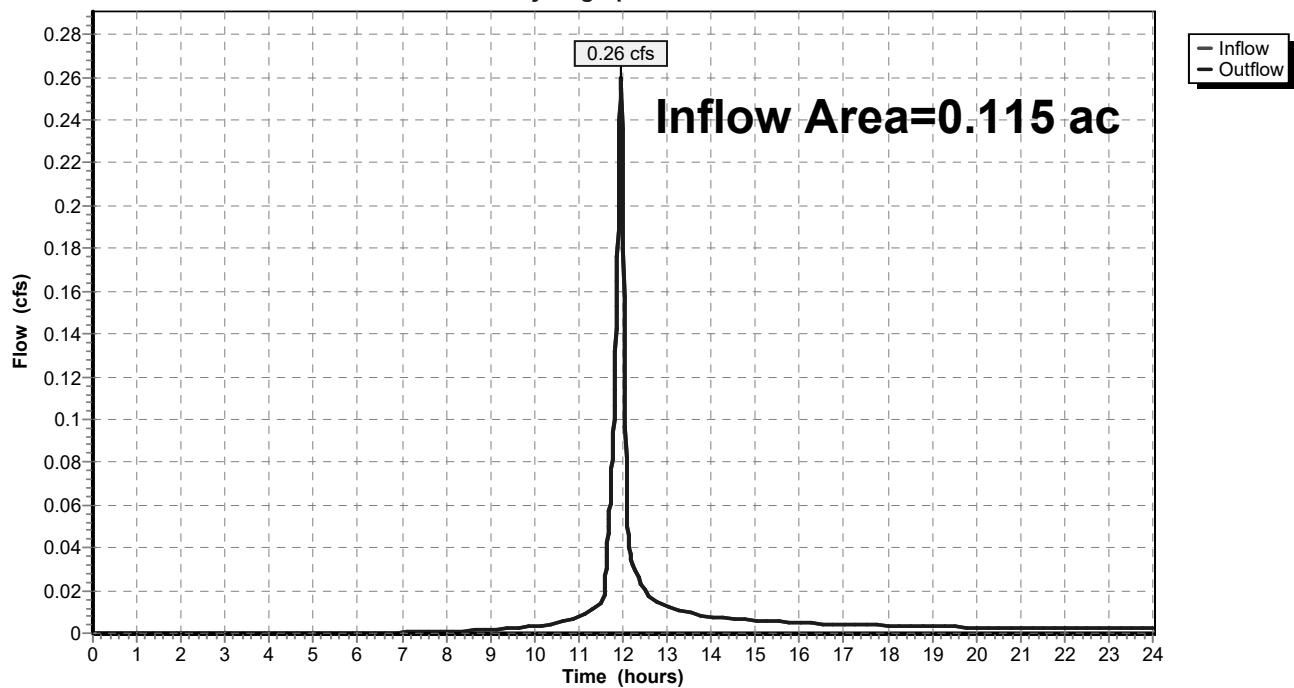
Summary for Reach 2: EX POI #1

Inflow Area = 0.115 ac, 77.37% Impervious, Inflow Depth > 1.26" for 1-YR event
Inflow = 0.26 cfs @ 11.96 hrs, Volume= 0.012 af
Outflow = 0.26 cfs @ 11.96 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2: EX POI #1

Hydrograph



16414-hydrocad-CURRENT

Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 3: EX DA2

Runoff = 0.70 cfs @ 11.96 hrs, Volume= 0.033 af, Depth> 1.26"

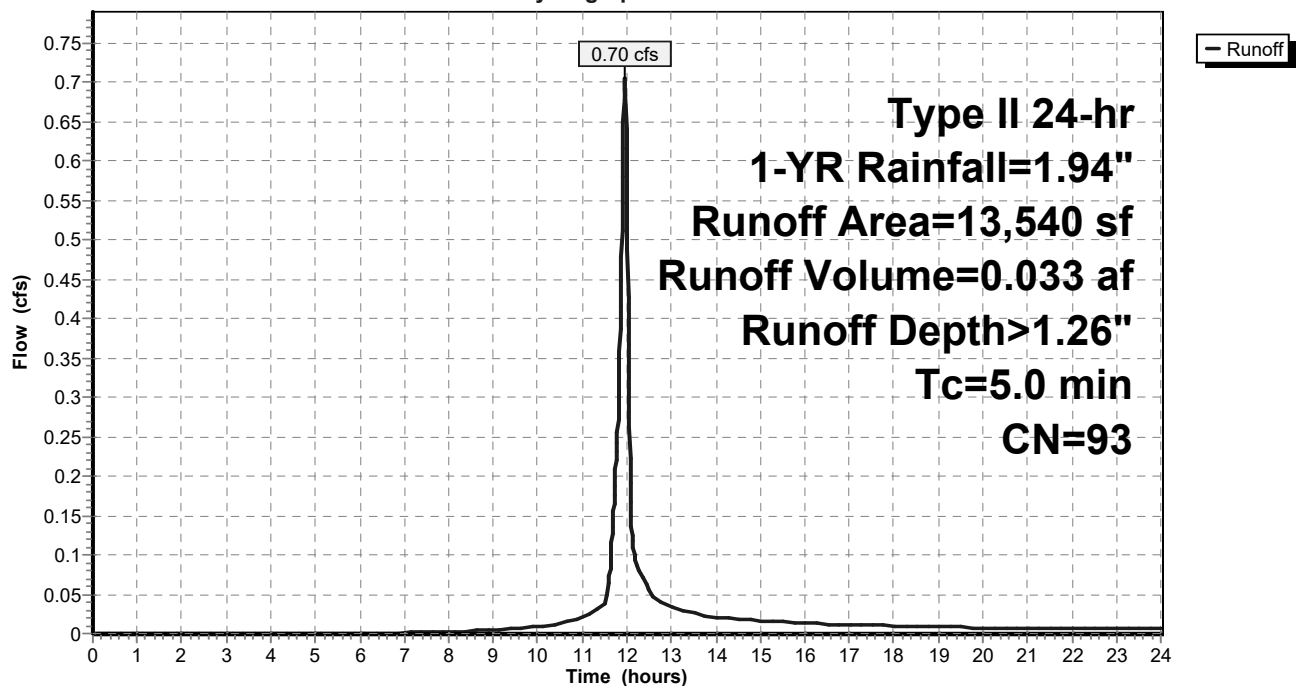
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	10,880	98	Impervious
	2,660	74	>75% Grass cover, Good, HSG C
	13,540	93	Weighted Average
	2,660		19.65% Pervious Area
	10,880		80.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 3: EX DA2

Hydrograph



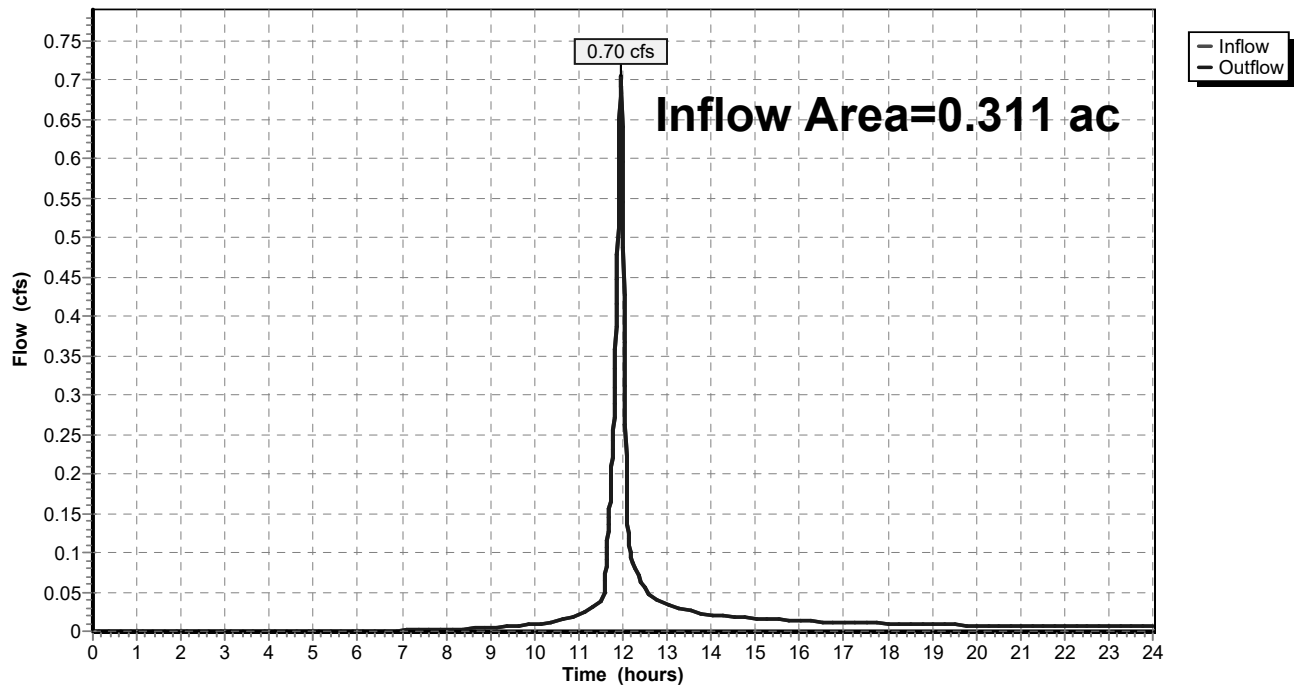
Summary for Reach 4: EX POI #2

Inflow Area = 0.311 ac, 80.35% Impervious, Inflow Depth > 1.26" for 1-YR event
Inflow = 0.70 cfs @ 11.96 hrs, Volume= 0.033 af
Outflow = 0.70 cfs @ 11.96 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4: EX POI #2

Hydrograph



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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 5: PRE DA1

Runoff = 0.12 cfs @ 11.97 hrs, Volume= 0.005 af, Depth> 0.57"

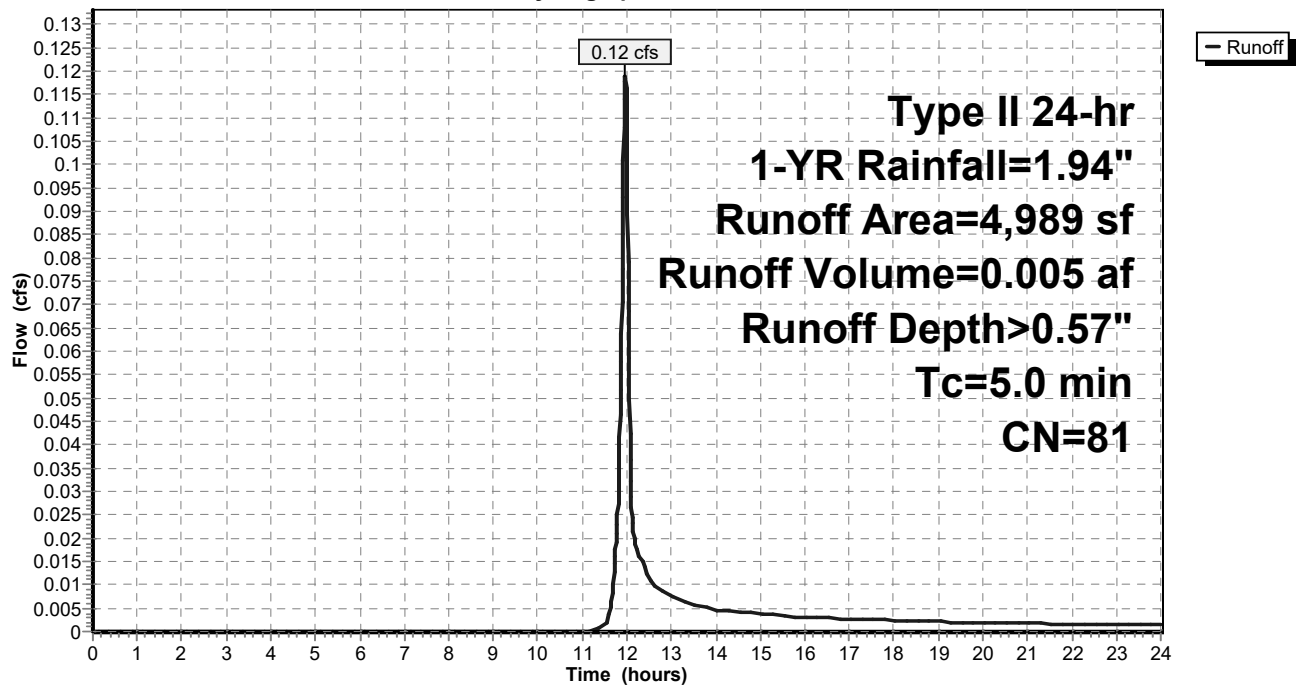
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	1,930	98	Impervious
	3,059	71	Meadow, non-grazed, HSG C
	4,989	81	Weighted Average
	3,059		61.31% Pervious Area
	1,930		38.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 5: PRE DA1

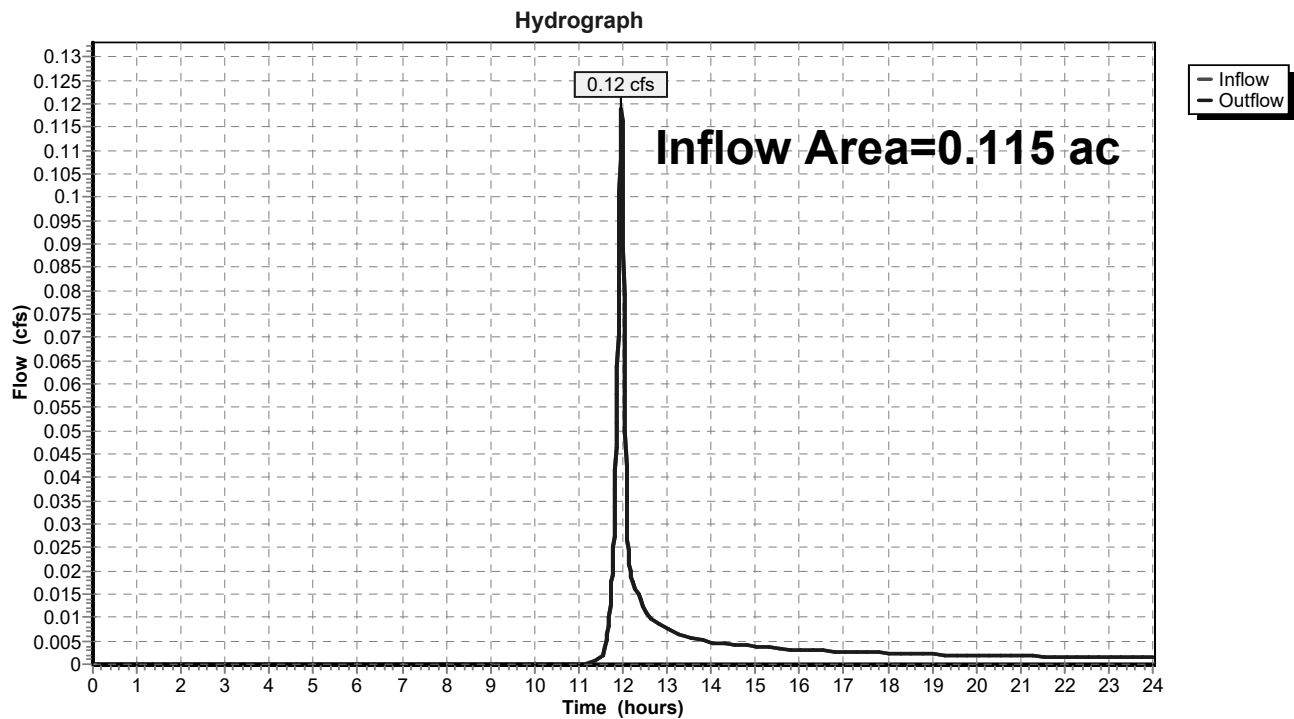
Hydrograph



Summary for Reach 6: PRE POI #1

Inflow Area = 0.115 ac, 38.69% Impervious, Inflow Depth > 0.57" for 1-YR event
Inflow = 0.12 cfs @ 11.97 hrs, Volume= 0.005 af
Outflow = 0.12 cfs @ 11.97 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 6: PRE POI #1

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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 7: PRE DA2

Runoff = 0.35 cfs @ 11.97 hrs, Volume= 0.016 af, Depth> 0.61"

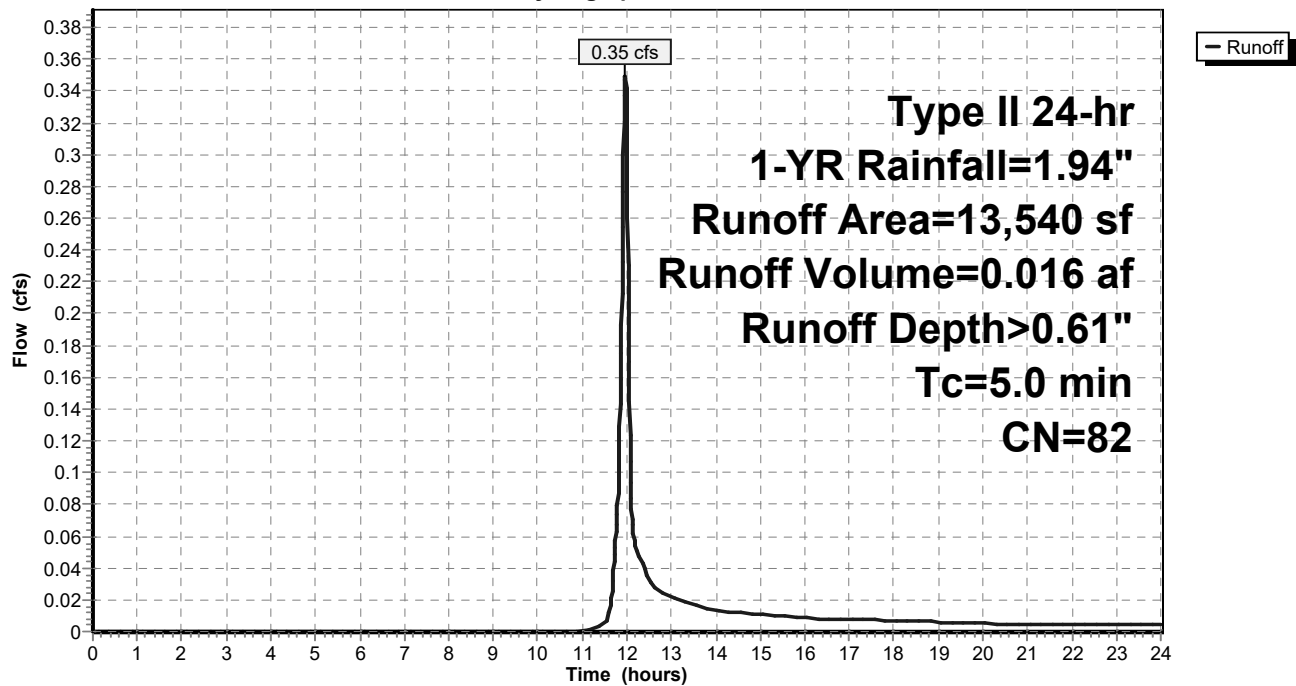
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	5,440	98	Impervious
	8,100	71	Meadow, non-grazed, HSG C
	13,540	82	Weighted Average
	8,100		59.82% Pervious Area
	5,440		40.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 7: PRE DA2

Hydrograph

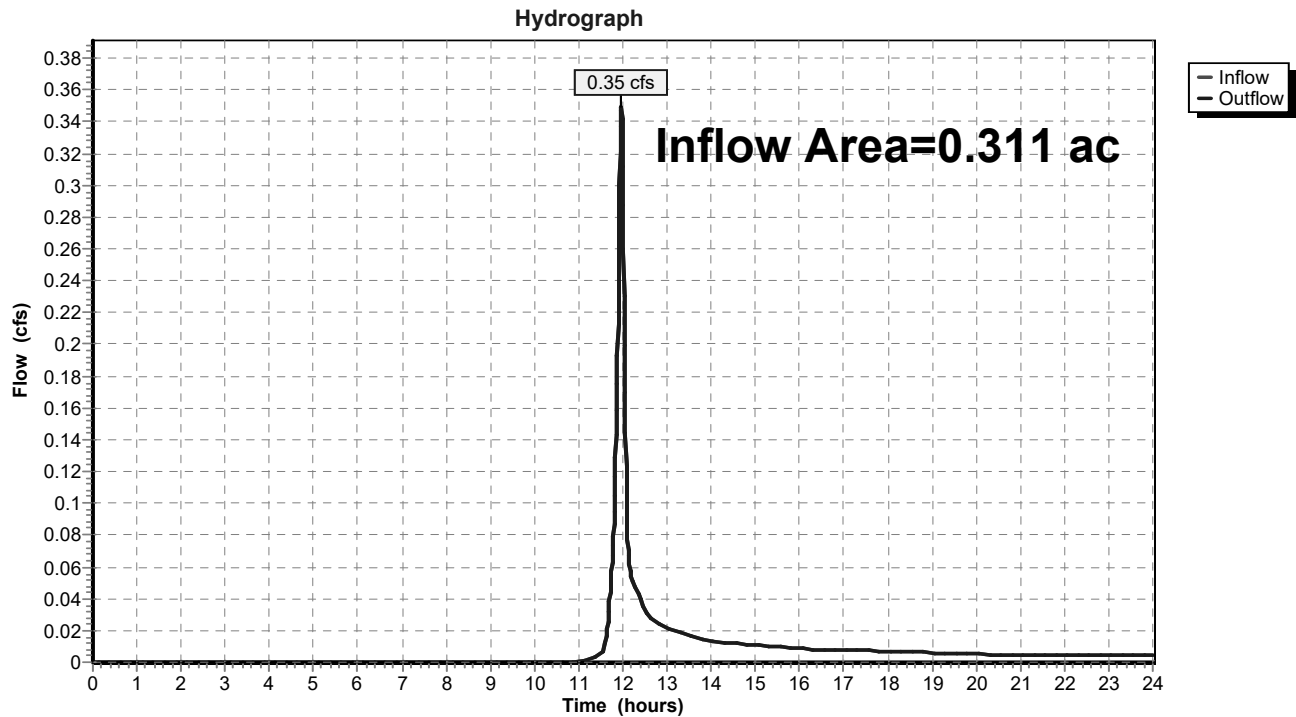


Summary for Reach 8: PRE POI #2

Inflow Area = 0.311 ac, 40.18% Impervious, Inflow Depth > 0.61" for 1-YR event
 Inflow = 0.35 cfs @ 11.97 hrs, Volume= 0.016 af
 Outflow = 0.35 cfs @ 11.97 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 8: PRE POI #2



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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 9: POST DA1-1

Runoff = 0.06 cfs @ 11.98 hrs, Volume= 0.003 af, Depth> 0.38"

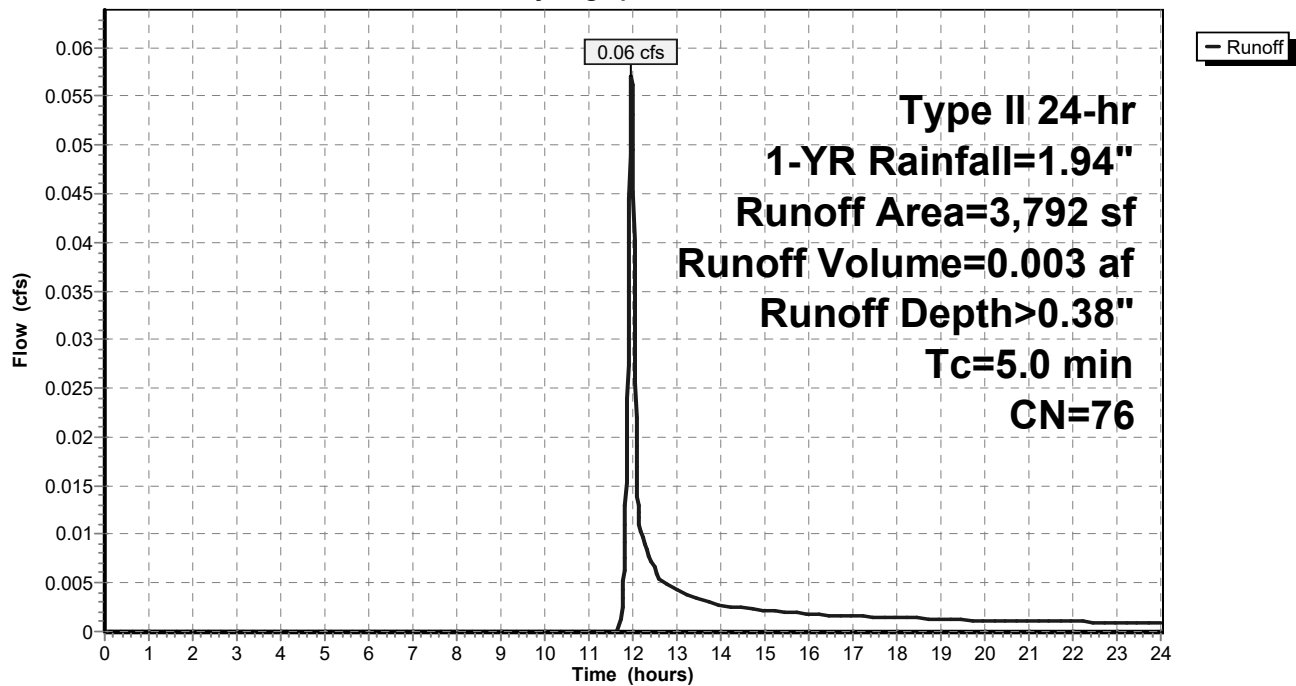
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	308	98	Impervious
	3,484	74	>75% Grass cover, Good, HSG C
	3,792	76	Weighted Average
	3,484		91.88% Pervious Area
	308		8.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 9: POST DA1-1

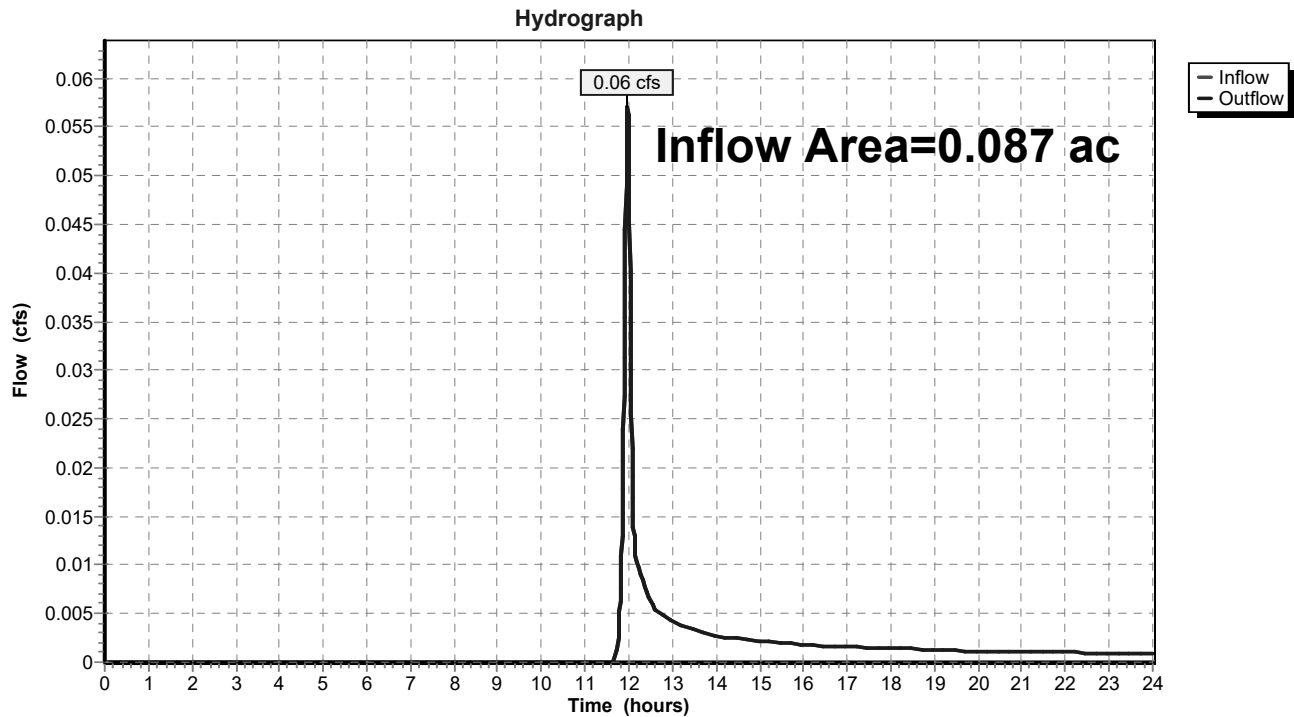
Hydrograph



Summary for Reach 10: POST POI #1

Inflow Area = 0.087 ac, 8.12% Impervious, Inflow Depth > 0.38" for 1-YR event
Inflow = 0.06 cfs @ 11.98 hrs, Volume= 0.003 af
Outflow = 0.06 cfs @ 11.98 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 10: POST POI #1

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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 11: POST DA2-1

Runoff = 0.58 cfs @ 11.96 hrs, Volume= 0.030 af, Depth> 1.71"

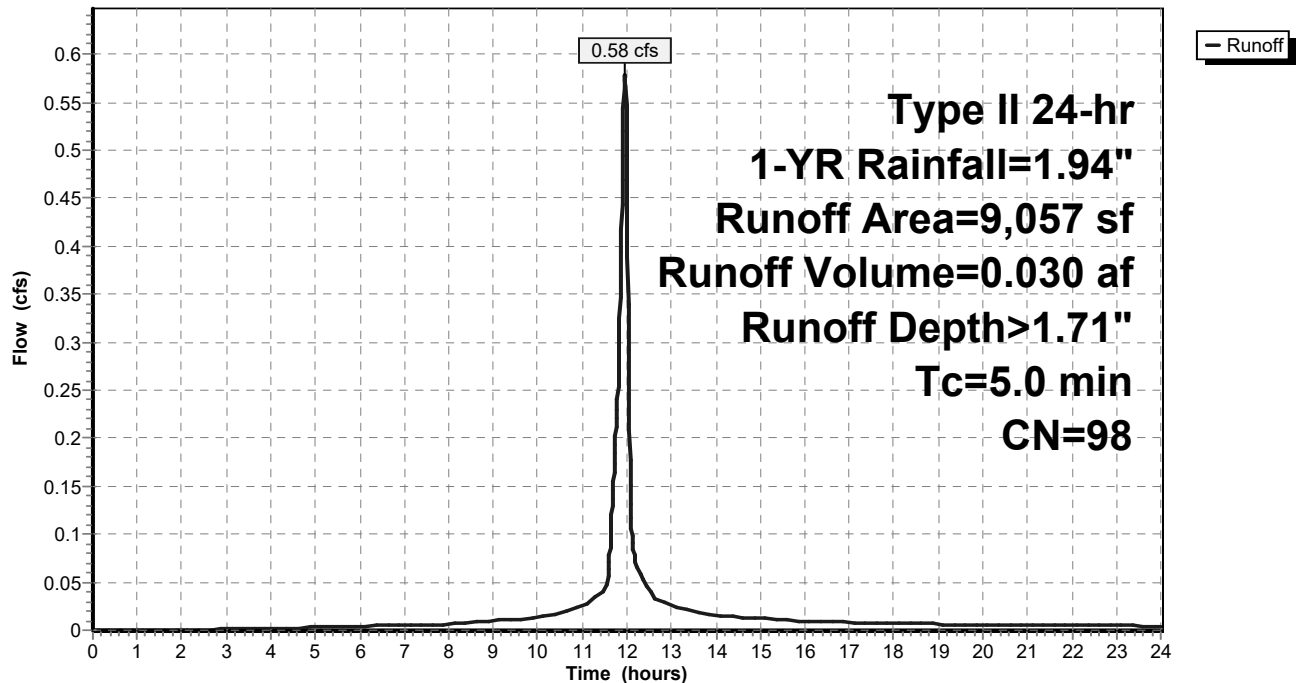
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	9,057	98	Impervious: Roof
	9,057		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 11: POST DA2-1

Hydrograph



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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Pond 12: Tank

Inflow Area = 0.208 ac, 100.00% Impervious, Inflow Depth > 1.71" for 1-YR event
 Inflow = 0.58 cfs @ 11.96 hrs, Volume= 0.030 af
 Outflow = 0.21 cfs @ 12.06 hrs, Volume= 0.029 af, Atten= 64%, Lag= 6.2 min
 Primary = 0.21 cfs @ 12.06 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.44' @ 12.06 hrs Surf.Area= 0 sf Storage= 483 cf

Plug-Flow detention time= 68.4 min calculated for 0.029 af (99% of inflow)
 Center-of-Mass det. time= 59.2 min (822.3 - 763.1)

Volume	Invert	Avail.Storage	Storage Description
#1	131.00'	585 cf	Custom Stage Data Listed below

Elevation (feet)	Cum.Store (cubic-feet)
131.00	0
132.00	66
133.00	132
134.00	198
135.00	264
136.00	330
137.00	396
137.40	422
137.50	585

Device	Routing	Invert	Outlet Devices
#1	Primary	131.20'	12.0" Round 12" PVC L= 7.0' Ke= 0.900 Inlet / Outlet Invert= 131.20' / 131.13' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	131.20'	1.0" Vert. Orifice/Grate C= 0.600
#3	Primary	137.40'	6.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=0.21 cfs @ 12.06 hrs HW=137.44' (Free Discharge)

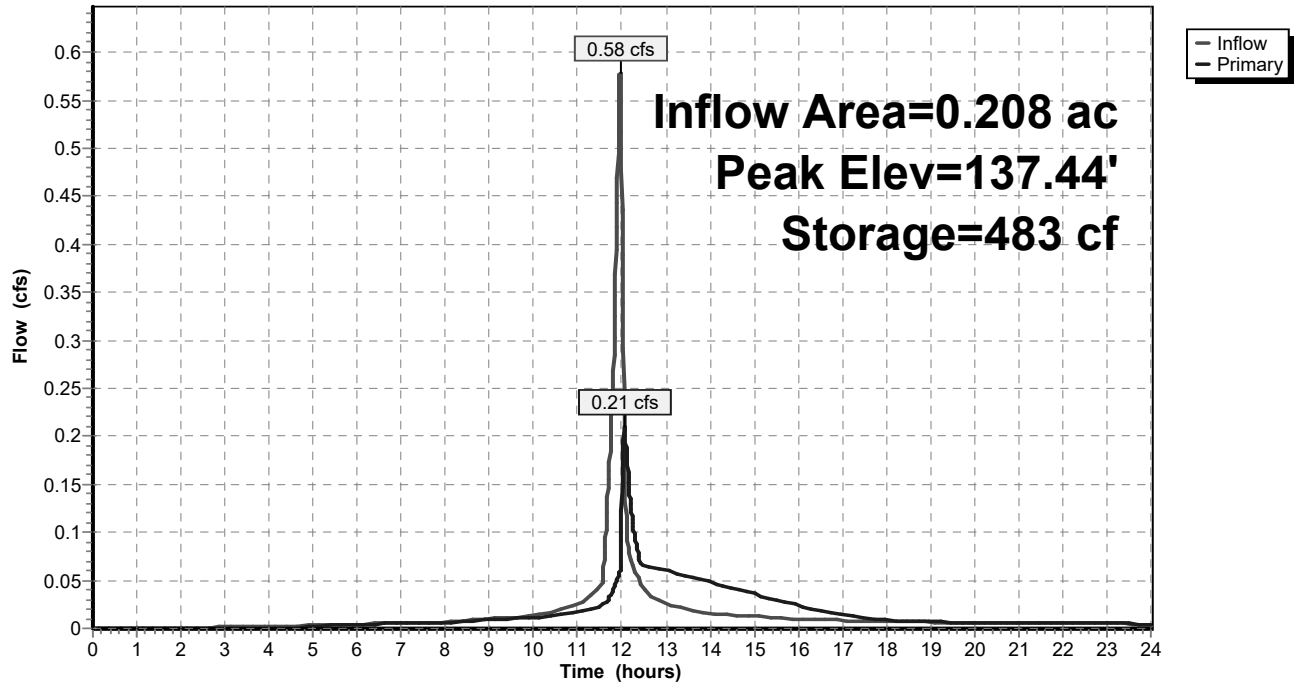
1=12" PVC (Passes 0.07 cfs of 7.15 cfs potential flow)

2=Orifice/Grate (Orifice Controls 0.07 cfs @ 11.98 fps)

3=Sharp-Crested Rectangular Weir (Weir Controls 0.14 cfs @ 0.63 fps)

Pond 12: Tank

Hydrograph



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Type II 24-hr 1-YR Rainfall=1.94"

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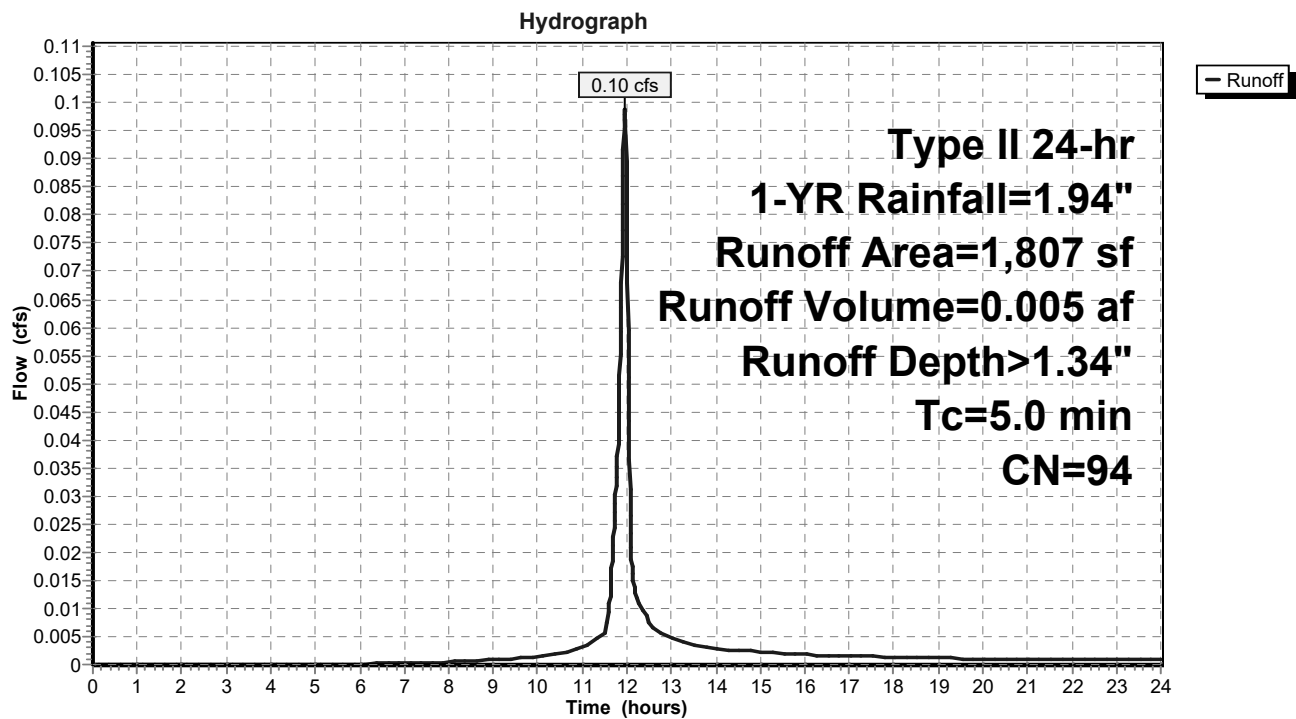
Summary for Subcatchment 13: POST DA2-2

Runoff = 0.10 cfs @ 11.96 hrs, Volume= 0.005 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	1,539	98	Impervious: Drive/Conc
	268	74	>75% Grass cover, Good, HSG C
	1,807	94	Weighted Average
	268		14.83% Pervious Area
	1,539		85.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 13: POST DA2-2

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Summary for Reach 14: 12" PVC

Inflow Area = 0.041 ac, 85.17% Impervious, Inflow Depth > 1.34" for 1-YR event
Inflow = 0.10 cfs @ 11.96 hrs, Volume= 0.005 af
Outflow = 0.10 cfs @ 11.99 hrs, Volume= 0.005 af, Atten= 1%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.49 fps, Min. Travel Time= 1.0 min

Avg. Velocity = 0.75 fps, Avg. Travel Time= 3.2 min

Peak Storage= 6 cf @ 11.97 hrs

Average Depth at Peak Storage= 0.10'

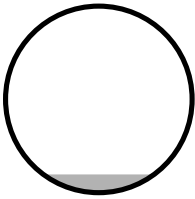
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.94 cfs

12.0" Round Pipe

n= 0.010 PVC, smooth interior

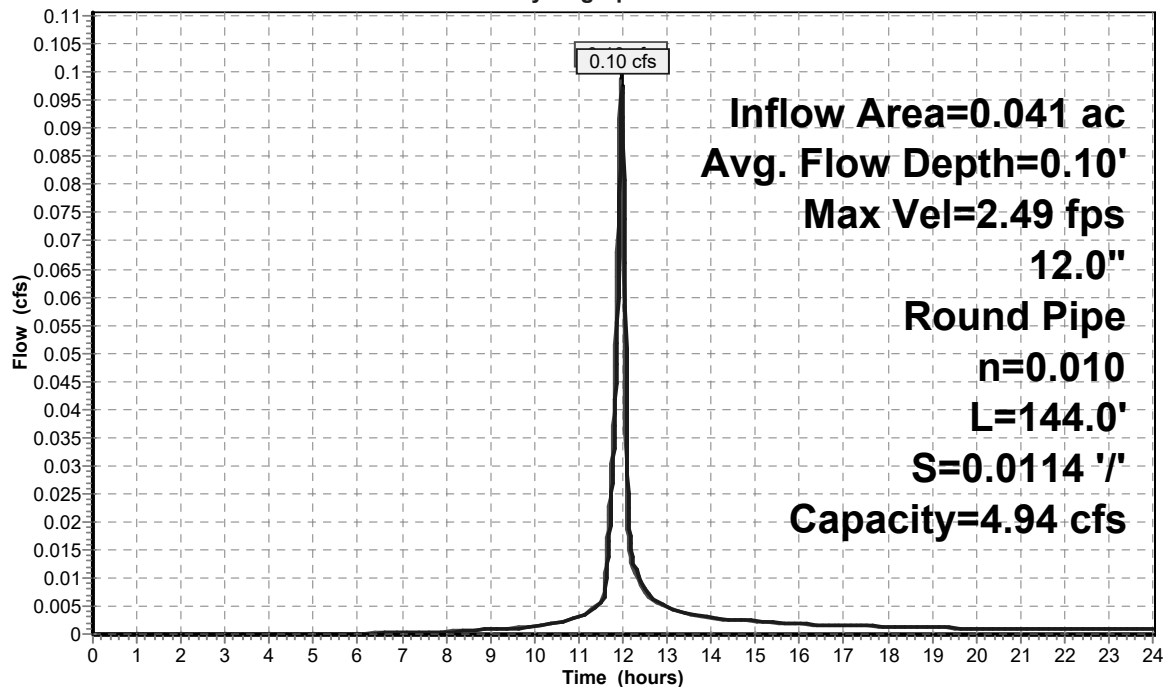
Length= 144.0' Slope= 0.0114 '/'

Inlet Invert= 133.00', Outlet Invert= 131.36'



Reach 14: 12" PVC

Hydrograph



— Inflow
- - Outflow

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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 15: POST DA2-3

Runoff = 0.08 cfs @ 11.97 hrs, Volume= 0.004 af, Depth> 0.65"

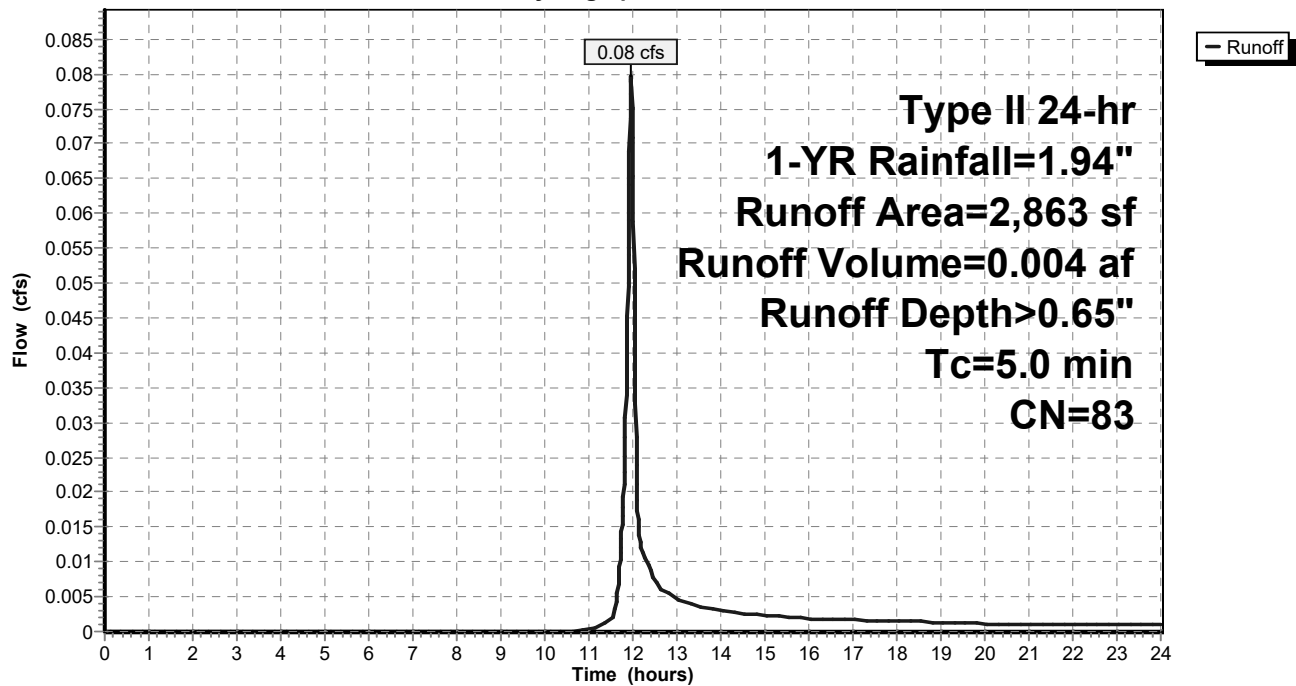
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	1,097	98	Impervious: Drive/Conc
	1,766	74	>75% Grass cover, Good, HSG C
	2,863	83	Weighted Average
	1,766		61.68% Pervious Area
	1,097		38.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 15: POST DA2-3

Hydrograph



Summary for Pond 16: Rain Garden

Inflow Area = 0.066 ac, 38.32% Impervious, Inflow Depth > 0.65" for 1-YR event
 Inflow = 0.08 cfs @ 11.97 hrs, Volume= 0.004 af
 Outflow = 0.03 cfs @ 12.07 hrs, Volume= 0.002 af, Atten= 64%, Lag= 6.1 min
 Discarded = 0.00 cfs @ 12.07 hrs, Volume= 0.001 af
 Primary = 0.03 cfs @ 12.07 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 138.78' @ 12.07 hrs Surf.Area= 110 sf Storage= 56 cf

Plug-Flow detention time= 192.0 min calculated for 0.002 af (66% of inflow)
 Center-of-Mass det. time= 73.6 min (928.0 - 854.4)

Volume	Invert	Avail.Storage	Storage Description	
#1	136.50'	83 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
136.50	48	0.0	0	0
138.25	48	17.0	14	14
138.75	106	100.0	39	53
139.00	137	100.0	30	83

Device	Routing	Invert	Outlet Devices
#1	Discarded	136.50'	0.300 in/hr Exfiltration over Surface area
#2	Primary	135.75'	8.0" Round Culvert L= 28.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.75' / 135.47' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	138.75'	6.0" Horiz. Yard Drain C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.07 hrs HW=138.78' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

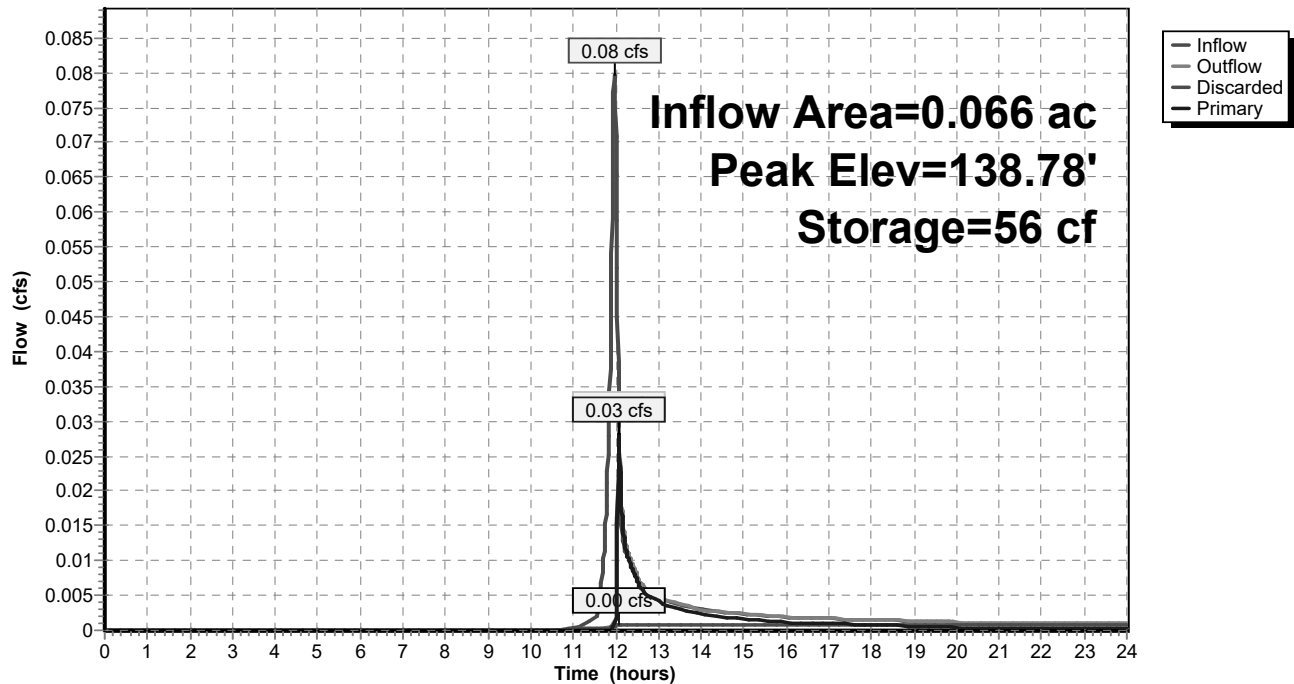
Primary OutFlow Max=0.03 cfs @ 12.07 hrs HW=138.78' (Free Discharge)

↑ **2=Culvert** (Passes 0.03 cfs of 2.76 cfs potential flow)

↑ **3=Yard Drain** (Weir Controls 0.03 cfs @ 0.57 fps)

Pond 16: Rain Garden

Hydrograph



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Type II 24-hr 1-YR Rainfall=1.94"

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Summary for Subcatchment 17: POST DA2-4

Runoff = 0.06 cfs @ 11.96 hrs, Volume= 0.003 af, Depth> 1.71"

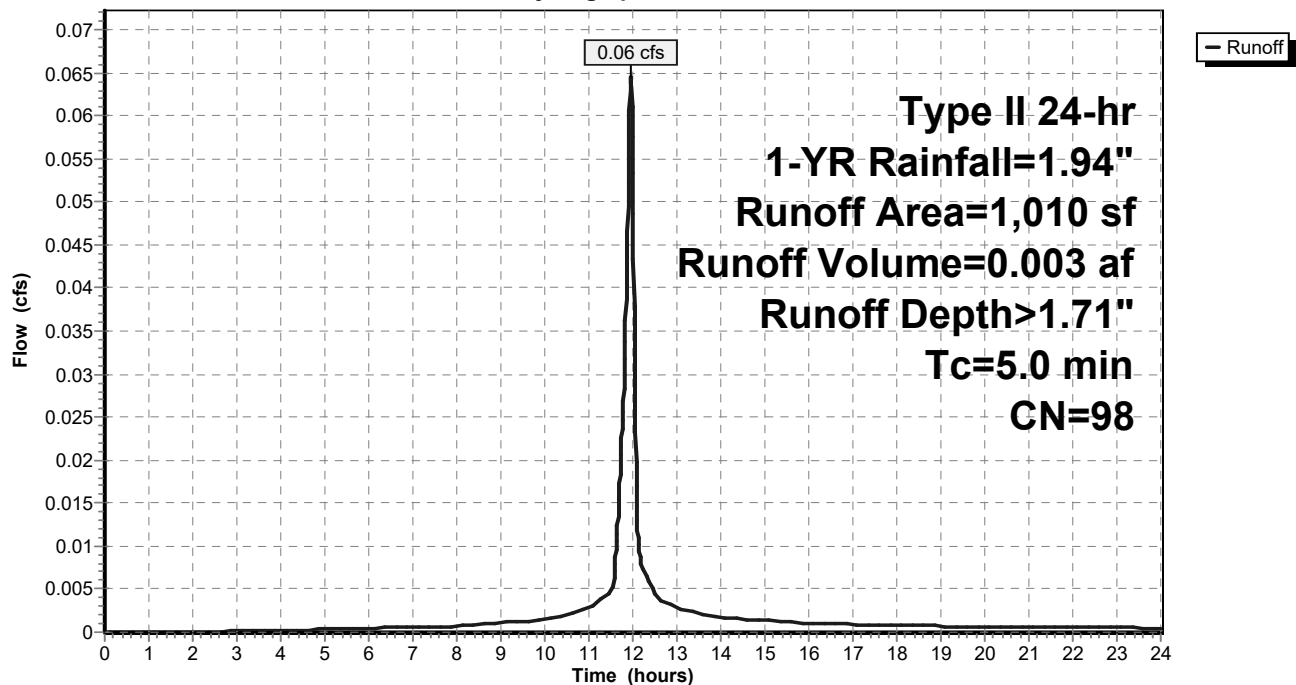
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=1.94"

	Area (sf)	CN	Description
*	1,010	98	Impervious: Drive/Conc
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, minimum

Subcatchment 17: POST DA2-4

Hydrograph

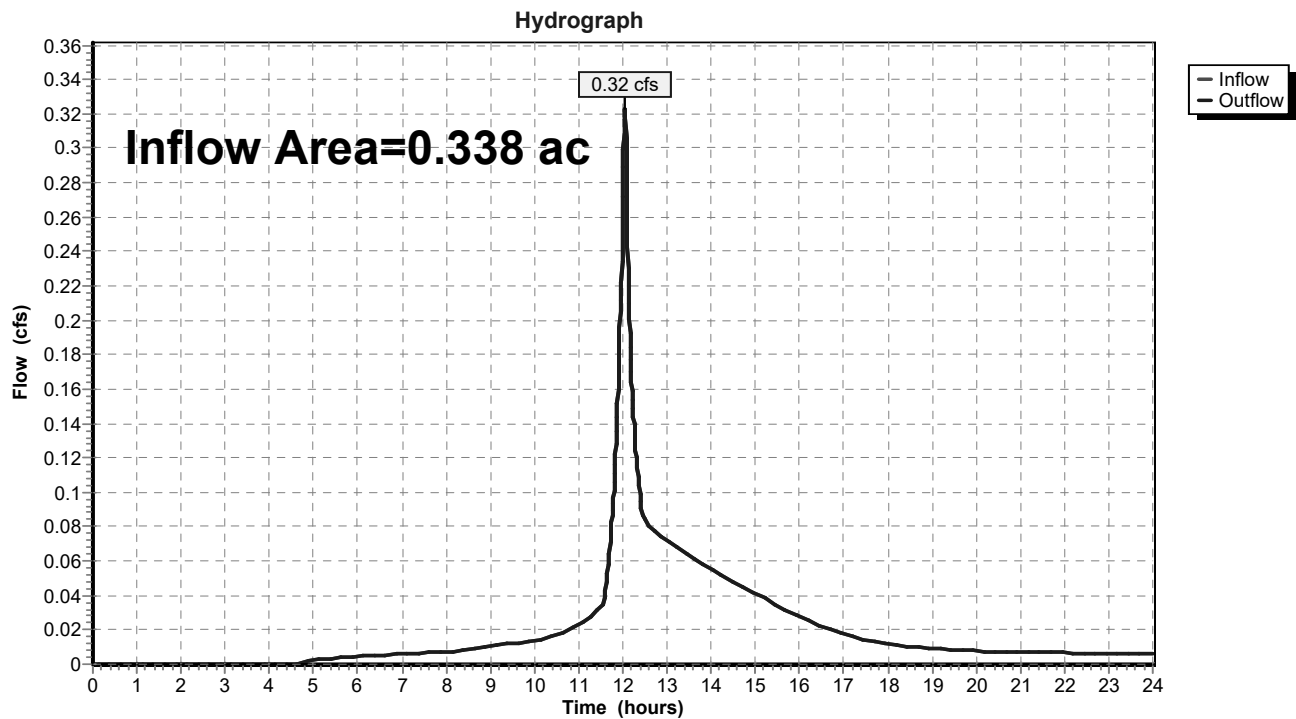


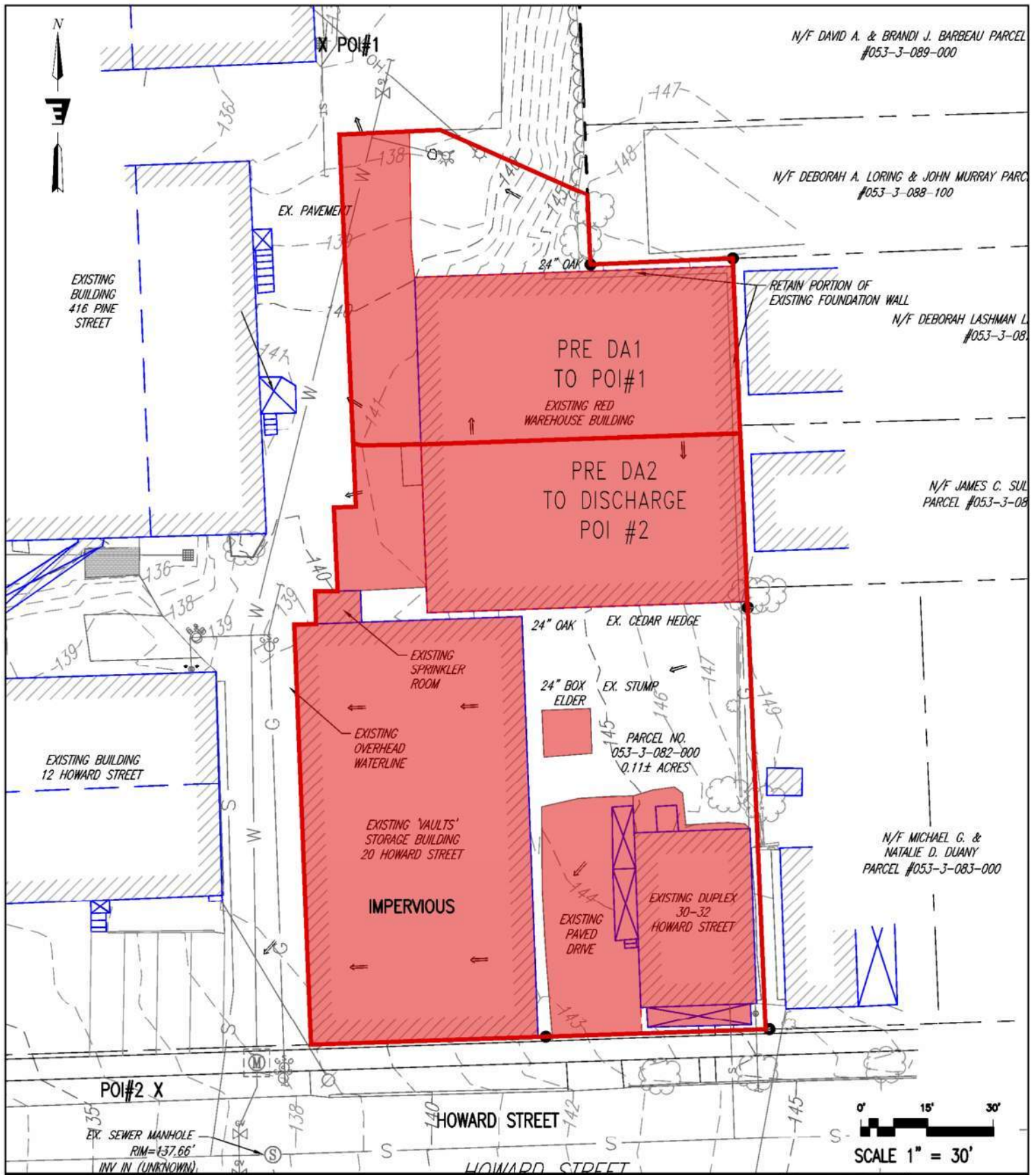
Summary for Reach 18: POST POI #2

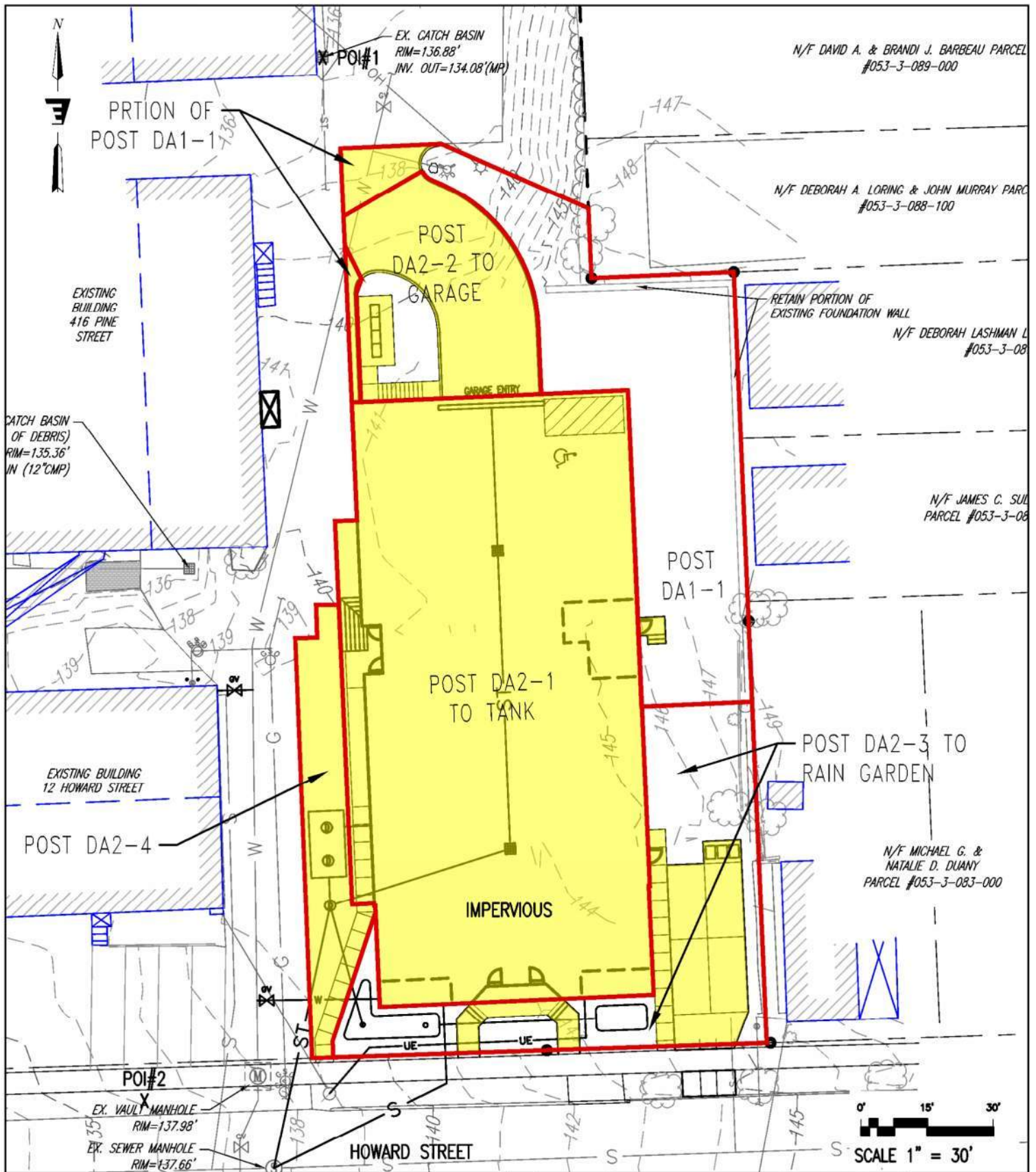
Inflow Area = 0.338 ac, 86.20% Impervious, Inflow Depth > 1.38" for 1-YR event
 Inflow = 0.32 cfs @ 12.05 hrs, Volume= 0.039 af
 Outflow = 0.32 cfs @ 12.05 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

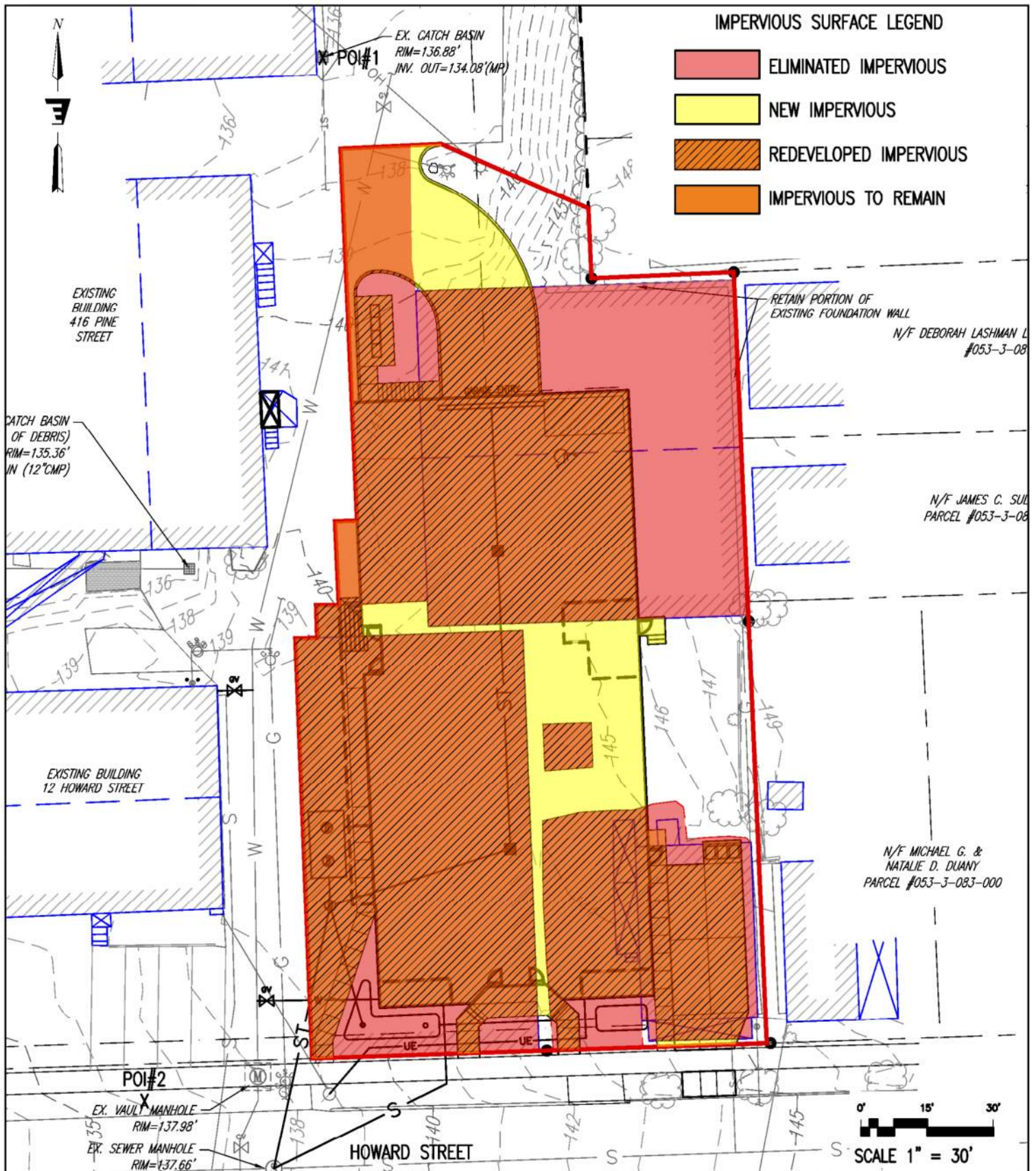
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 18: POST POI #2









REMAINING/REDEVELOPED/NEW IMPERVIOUS
STOMRWATER EXHIBIT C

The Vaults Redevelopment Project
Pine Street & Howard Street



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85 Mechanic Street, Suite B2-2, Lebanon, NH 03766
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www.engineeringventures.com

Checked By: KW	1" = 30'
Drawn By: HKW	Project No.: 16414
Date: 12/21/16	Drawing No.: EXHIBIT C

Stormwater Operation & Maintenance Manual

The proposed Vaults building, located in Burlington, east of the Pine Street and Howard Street intersection features a number of stormwater appurtenances which require inspection and maintenance on a regular basis. These features include stormwater collection structures, a rain garden with sediment forebay, an underground detention tank and stormwater manhole. In order to provide long-term functionality of the stormwater system, Unsworth Properties, LLC shall be responsible for providing ongoing site inspections and maintenance. It is recommended that the site be inspected on a semi-annual basis, once after snow-melt and once before leaf-drop.

This document identifies the inspection and maintenance requirements of each of the stormwater features.

1. The owner shall be responsible for conducting the required inspection, reporting and maintenance activities outlined by this document:

Unsworth Properties, LLC
26 Railroad Avenue
Essex Junction, VT 05452
Phone: (802) 879-4504

2. An inspection checklist (attached) shall be completed during each inspection.
3. An Operation & Maintenance Log shall be completed to track each inspection as well as maintenance activities. The Log can be found attached to this document.
4. An Operation & Maintenance Plan identifies on-site stormwater appurtenances and is attached to this document.
5. The frequency of the inspections shall be as follows:

RG - Rain Garden:

- During the first six months after installation, the rain garden shall be inspected after rain events of at least one inch to ensure the system functions correctly.
- During the first growing season (April through October), the following shall be performed to ensure vegetation is properly established; re-seed bare or eroding areas, water (1/2 to one inch) each week depending on rainfall amounts, remove weeds and invasive species and remove and replace dead and/or diseased plants.
- After the first growing season, the rain garden shall be inspected annually.
- Sediment shall be removed once accumulation reaches one inch.
- If ponding is noted on the surface of the filter bed, the top 3-inches of material shall be removed and replaced. Removed sediments shall be disposed of in an acceptable manner.
- Underdrains shall be flushed to remove debris or sediment build-up.
- Prune vegetation and remove trash and debris as necessary.
- Use of herbicides is not recommended.
- Rain garden shall not be used as snow storage during the winter months.

FB – Rain Garden Sediment Forebay:

- A fixed vertical marker shall be installed in order to easily measure sediment accumulation.
- Sediment shall be removed annually or once accumulation approaches six inches.
- Note sediment accumulation depth at time of inspection as well as maintenance performed.
- Sediment forebay shall not be used as snow storage during the winter months.

CB1, CB2, TD & MH - Deep Sump Catch Basins, Trench Drain & Storm Manhole:

- Sediment shall be removed annually and when sediment accumulates to a depth greater than or equal to half of the structures sump depth.

TANK - Stormwater Detention Tank:

- Follow manufacturers guidelines for operation and maintenance.
- Sediment shall be removed annually and when sediment accumulation approaches a depth of six inches.
- Orifice shall be inspected to ensure it is free of debris and obstructions.

SWL - Grassed Swale:

- Inspect and remove trash and debris annually.
- Sediment shall be removed once accumulation approaches a depth of six inches.

O&M Checklist

Inspector:	Date:
Current Weather:	Time:
Rainfall in the Last 24 Hours (in): Can be checked here: http://www.nrcc.cornell.edu/page_nowdata.html	

Rain Garden Components: Inspection Required Annually, Recommended Twice Annually

***Inspections Required after rainfall events of at least 1-inch during six months after installation

Items Inspected (Frequency)	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
1. Rain gardens and contributing areas clean of debris						
2. No dumping of yard wastes into rain garden						
3. Litter (trash, debris, etc.) have been removed						
VEGETATION						
4. No evidence of erosion.						
5. Is plant composition still according to plans						
6. No placement of inappropriate plants.						
7. No evidence of invasive species.						
DEWATERING AND SEDIMENTATION						
8. Surface ponds dewater between storms.						
9. No evidence of standing water.						
10. No evidence of surface clogging.						
OUTLETS/OVERFLOW						
11. Good condition, no need for repair						
12. No evidence of erosion.						
13. No evidence of any blockages.						
INTEGRITY OF BIOFILTER						
14. Rain garden has not been blocked or filled inappropriately.						
15. Mulch layer is still in place (depth of at least 3").						
16. Noxious plants or weeds removed.						

O&M Checklist (cont.)

Inspector:	Date:
Current Weather:	Time:
Rainfall in the Last 24 Hours (in): Can be checked here: http://www.nrcc.cornell.edu/page_nowdata.html	

Sediment Forebay: Inspection Required Annually, Recommended Twice Annually

***Inspections Required after rainfall events of at least 1-inch during six months after installation

Items Inspected	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
17. Contributing areas clean of debris						
18. No dumping of yard wastes into rain garden						
19. Litter (trash, debris, etc.) have been removed						
OUTLET						
20. Good condition, no need for repair						
21. No evidence of erosion.						
22. No evidence of any blockages.						
23. No standing water.						

Underground Stormwater Detention Tank: Inspection Required Annually, Recommended Twice Annually

Items Inspected	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
24. Contributing area (roof) clean of debris						
25. Litter (trash, debris, etc.) have been removed						
26. Sediment removed if approaching six inch depth.						
27. Floating hydrocarbons removed immediately by skimming, absorbent materials, or other method and disposed in conformance with applicable state and federal regulations.						
OUTLETS/ORIFICE/OVERFLOW						
28. Good condition, no need for repair						
29. No evidence of any blockages.						

O&M Checklist (cont.)

Inspector:	Date:
Current Weather:	Time:
Rainfall in the Last 24 Hours (in): Can be checked here: http://www.nrcc.cornell.edu/page_nowdata.html	

Catch Basins, Trench Drain & Manhole: Inspection Required Annually, Recommended Twice Annually

Items Inspected	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
30. Contributing areas clean of debris						
31. Litter (trash, debris, etc.) have been removed						
32. Sediment removed if approaching half the sump depth.						
33. Floating hydrocarbons removed immediately by skimming, absorbent materials, or other method and disposed in conformance with applicable state and federal regulations.						

Grassed Swale: Inspection Required Annually, Recommended Twice Annually

Items Inspected	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
34. Contributing areas clean of debris						
35. Litter (trash, debris, etc.) have been removed						
36. Sediment removed if approaching six inch depth.						

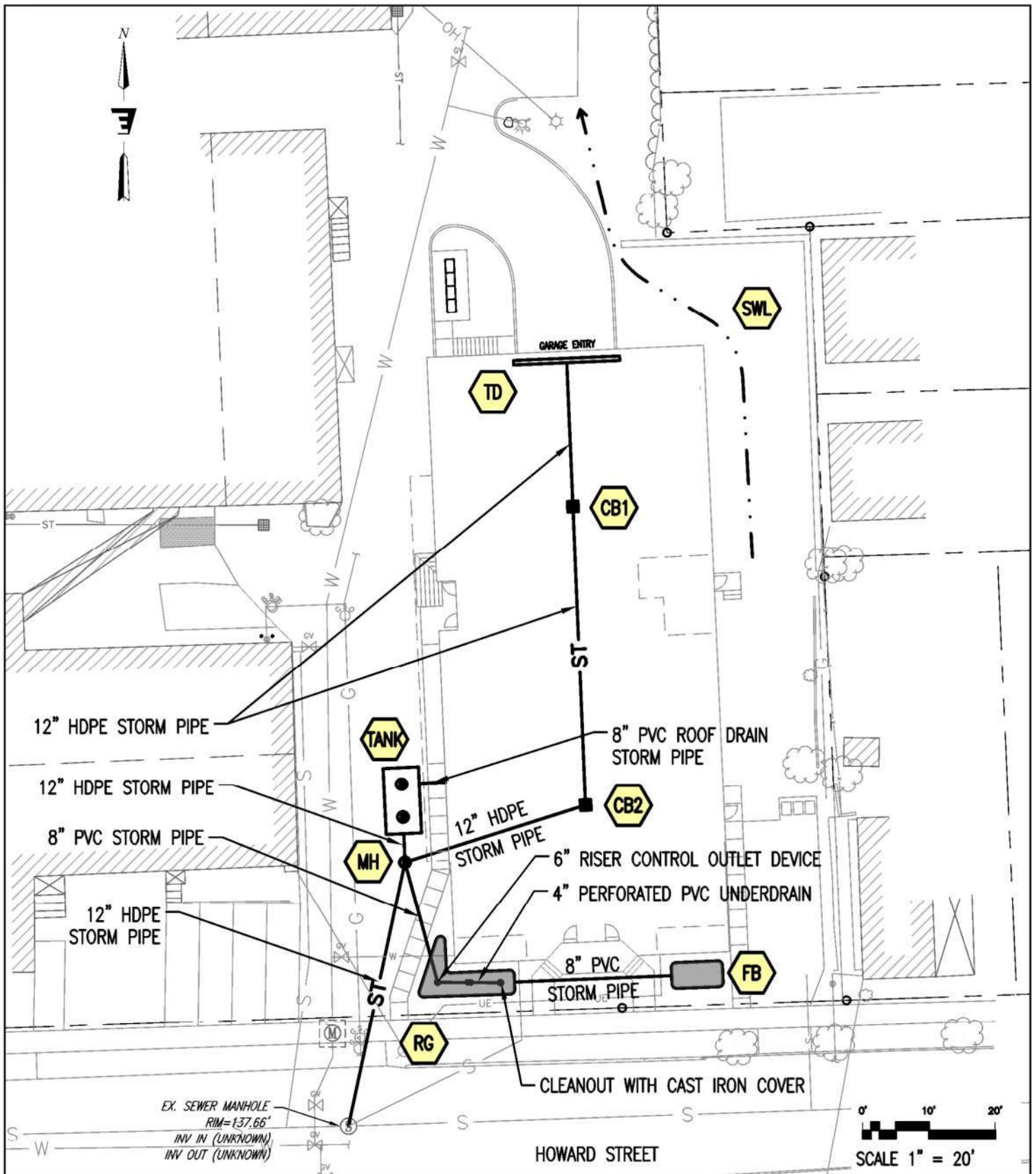
Comments: _____

Date by which outstanding maintenance must be completed: _____

Inspector's Signature: _____

O&M Log

Date	Appurtenances Inspected	Maintenance Performed	Inspector's Signature



OPERATION & MAINTENANCE PLAN
STORMWATER EXHIBIT D

The Vaults Redevelopment Project
Pine Street & Howard Street

**ENGINEERING
VENTURES PC**

208 Flynn Avenue, Suite 2A Burlington, VT 05401
tel. 802.863.6225 • fax 802.863.6306
85 Mechanic Street, Suite B2-2, Lebanon, NH 03766
tel. 603.442.9333 • fax 603.442.9331
www.engineeringventures.com

Checked By:

KW

Drawn By:

HKW

Date:

01/09/17

Scale:

1" = 20'

Project No.:

16414

Drawing No.:

EXHIBIT D



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 400 Pine Street & 30-32 Howard Street

2. Zoning Permit Address (if different from above): _____

3. Brief Project Description (i.e. building construction, subdivision, site work)

Demolition of (3) existing structures, merger of the two lots and construction of a (3) story mixed use building with a additional level for underground parking.

4. Owner Name: Howard Space Partnership LLP (Unsworth Properties, James Unsworth)

5. Owner Mailing Address: 26 Railroad Avenue, Essex Junction, VT 05452

6. Owner Phone: (802) 879-4504

6. Owner email: james@unsworthproperties.com

7. Contractor Name: _____ ☒ Contractor not known at this time

8. Contractor Phone: _____ 9. Contractor Email: _____

10. Estimated Project Start Date April 2017

Estimated End Date September 2017

11. Area of Land Disturbance 24,677 sq. ft.

12. Total proposed (existing + new) amount of impervious: 18,696 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.

- 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

Name

Signature

Date

Additional Conditions of Approval:

AN EROSION PREVENTION AND SEDIMENT CONTROL PLAN

FOR THE PROJECT AT:

HAS BEEN FILED WITH THE CITY OF BURLINGTON
STORMWATER MANAGEMENT PROGRAM IN ACCORDANCE
WITH CHAPTER 26 OF THE BURLINGTON CODE OF ORDINANCES

THIS REQUIRES THAT MEASURES BE INSTALLED OR TAKEN TO
PREVENT SEDIMENT FROM LEAVING THE SITE AND ENTERING
WATERWAYS AND IMPACTING CITY INFRASTRUCTURE
(RIGHT OF WAY AND STORMDRAINS)

FOR QUESTIONS OR TO REPORT SEDIMENT LEAVING THE SITE
CALL 802-863-4501

This notice to be posted in full view at all times during earth
disturbance. Additional conditions on attached.

Plan Approved by: _____ Date: _____
Burlington Stormwater Program

TYPICAL SOLUTIONS TO PREVENT OR CONTROL SEDIMENT AND EROSION

STOCKPILES

- Cover small stockpiles with a tarp when not being used.
- Install silt fencing or other appropriate devices around the stockpiles to filter sediment.
- Cover stockpiles with straw or other approved mulching material.
- Plan to remove any unusable material as soon as possible from the site to an approved location.
- Plant grass and mulch stockpiles that will be on site for more than 14 days.
- Cover, vegetate or install erosion matting on stockpiles that will remain disturbed over the winter.

DISTURBED AREAS

- Maintain vegetated buffers around disturbed areas.
- Install silt fencing or other appropriate device to filter sediment washing off from disturbed areas. Remember that the bottom of the silt fence must be “keyed in” (dug into ground) to work correctly.
- To prevent sediment from running off your site via your driveway (or other paved areas where you can’t install silt fence) use a row of hay bales or tube sand.
- Cover disturbed areas as soon as possible with straw or other approved mulching material. Use erosion control matting in high wind, traffic or slopes steeper than 3:1 (horizontal to vertical), and follow the manufacturer’s guidelines staple the matting down.
- Plant grass and mulch or use erosion control matting all disturbed areas that will remain exposed for more than 14 days.
- Cover, vegetate or install erosion matting on areas that will remain disturbed over the winter.
- Protect ditches, catch basins or water bodies off-site by using silt fencing, gravel check dams or other approved sediment control methods.

CONSTRUCTION VEHICLES

- Do not park construction vehicles on City owned green space. Vehicles disturb vegetation and compact the soil, thereby reducing its ability to infiltrate stormwater. Any green belt disturbance will need to be permanently stabilized with grass seed and erosion control matting.
- Prevent sediment from leaving the project by cleaning the tires of vehicles, or use clean gravel at project access points to clean tires.
- Sweep city streets, sidewalks and bikepaths daily or as needed to remove sediment transported from the project.

RESOURCES

The Vermont Handbook for Erosion Prevention and Sediment Control at:

http://vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf

The City of Burlington Stormwater Program Page at

<http://www.burlingtonvt.gov/DPW/Stormwater-Management>



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
 - Project Address: 400 Pine Street & 30-32 Howard Street
 - Owner: Howard Space Partnership, LLC
 - Engineer: Kevin Worden, PE - Engineering Ventures, PC
 - Brief project description: Demolition of (3) existing structures, merger of the two lots and construction of a (3) story mixed use building with a additional level for underground parking.

- Stormwater Management Plan

- Impervious¹ change summary

Project Area = 18,529 s.f.

Condition	Type	Total Impervious (s.f.)
Existing Conditions	Existing Impervious	14,744 s.f.
Proposed	Total Proposed (1+2+3)	13,015 s.f.
	1) New ²	1,857 s.f.
	2) Existing to Remain	6,910 s.f.
	3) Redeveloped	4,248 s.f.
Net New	Total Proposed – Existing	-1,729 s.f.

If available at this time:

- Existing conditions: *description of existing conditions, description of existing stormwater system, existing drainage issues, current connectivity to City system*

On site stormwater discharges into the combined sewer system on Howard Street, which ultimately receives treatment at Burlington's Main Wastewater treatment plant.

- 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)*

A sediment basin in conjunction with a rain garden will be used for treatment of runoff from the eastern tandem parking area. Additionally, a stormwater detention tank is proposed to capture roof runoff to be released into the existing system at a slower rate. Deep sump catch basins will be installed to capture runoff from the portion of the access drive draining to the garage as well as snow-melt from parked vehicles.

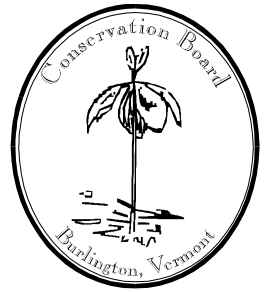
¹ Impervious = any surface off of which water runs off rather than infiltrates, including, but not limited to rooftops and paved/unpaved (gravel/packed dirt) driveways, walkways and patios

² Impervious where there is not currently impervious

Burlington Conservation Board

149 Church Street
Burlington, VT 05401
<http://www.ci.burlington.vt.us/planning/>
Telephone: (802) 865-7189
(802) 865-7195 (FAX)

Matt Moore, Chair
Will Flender, Vice Chair
Scott Mapes
Don Meals
Jeff Severson
Miles Waite
Damon Lane
Zoe Richards
Stephanie Young



Conservation Board Meeting Minutes

Monday, January 23, 2017 – 5:30 pm
Burlington Police Department – Community Room
1 North Avenue

Attendance

- **Board Members:** Zoe Richards (ZR), Matt Moore (MM), Jeff Severson (JS), Damon Lane (DL), Miles Waite (MW), Scott Mapes (SM), Stephanie Young (SY), Don Meals (DM)
- **Absent:** Will Flender (WF)
- **Public:** Cliff Collins, David Porteous (29 Starr Farm Beach), Frank von Turkovich, Andrew Mills, Andres Torizzo, Robert Butani, Brenda Orr, [Riverwatch HOA member], (80 Colchester Ave), Kevin Worden, Doug Vehman, James Unsworth, Hannah Wingate (400 Pine Street), 3 UVM graduate students
- **Staff:** Scott Gustin (Planning & Zoning)

MM, Chair, called the meeting to order at 5:35 p.m.

Minutes

January 9, 2017

SM noted on pg. 4, 4th paragraph, change first sentence to “SM, its good a large volume of stormwater is being taken out of the combined sewer.”

JS submitted changes in writing. They will be circulated to BCB members.

Defer acceptance of January 9 minutes to February 6 meeting.

Public Comment

None.

Board comment

None.

Open Space Subcommittee

No meeting.

Project Review

1.17-0669CA/MA; 29 Starr Farm Beach (Ward 4N, RL-W) David Porteous

Construct stone seawall, slope stabilization, and repair of stairs

Cliff Collins and David Porteous appeared.

Cliff Collins overviewed existing conditions. Wave action is eroding the shoreline and undermining the stairs down to the shore. The seawall is intended to stabilize the shoreline. It will tie into an adjacent seawall. The site is small at just about 375 sf. The duration of construction is expected to be brief. The site contractor will be required to install EPSC measures to keep things contained onsite.

MW, is there access to the beach? Mr. Collins, there is a gravel path that affords access.

The programs and services of the Dept. of Planning and Zoning are accessible to people with disabilities.
For accessibility information call 865-7188 (865-7142 TTY).

SM, what materials are proposed? Mr. Collins, redstone from Whitcomb's quarry.

A MOTION was made by JS and SECONDED by SM:

Support project as presented.

Vote: 8-0-0, motion carried.

2.17-0388CA/MA; 80 Colchester Ave (Ward 1E, I) Eastern Development Corp.
Construct 75-unit residential building and related parking and site improvements

Frank von Turkovich, Andrew Mills appeared on behalf of this application.

SG noted the project status. It has been reviewed 2 times by BCB already. Final stormwater details are to be addressed tonight.

Frank von Turkovich said their final stormwater analysis caused them to reconsider their stormwater management. They are now proposing a treatment area just east of the new building. He prefers this location, particularly for maintenance.

Andrew Mills said they've moved away from underground treatment to an above-ground treatment area (constructed wetland). Pre-treatment standards remain the same. The design has been submitted to DPW. They were receptive to the design. State Wetlands has preliminarily indicated that the project is approvable.

DM, what was the nature of DPW input? Mr. Mills, Jenna asked for updated EPSC info. DM, was it approved? Mr. Mills, not yet.

DL, talk about the 1 or 2 paths to discharge. Mr. Mills, the discharge areas are unchanged.

MW, the smaller wetland is not a permanent pool? Mr. Mills, it will be a shallow pool. It will be lined.

DM, 2 bands the look like incursions into the wetland. What are they? Mr. Mills, they note stabilization of the slope. DM, have you applied for the wetland permit? Mr. Mills, no.

ZR, what did you find in the test pits that made you change the management design? Mr. Mills, it is clearly a fill material.

MW, so you are going from underground to above-ground? Mr. Mills, yes.

SM, have you seen the document from Watershed Consulting Associates? Mr. Mills, yes.

MW, where does the unnamed tributary go? Mr. Mills, we have not looked further into it.

Public Comment:

Andres Torizzo (Watershed Consulting Associates), provided comments on behalf of Bob & Susan Butani. He has some comments and questions on the latest stormwater design. The areas in the model seem inconsistent with the memo. He didn't see any drainage maps. The site balancing issue needs to be addressed. Trying to manage existing impervious surface in exchange for new impervious surfaces. He wants to know where the existing impervious surfaces are. The applicant asserts that the groundwater recharge standard can be waived. He does not see how. He has questions about modeling beyond the 10-year storm event. Can larger storm events be handled by the constructed gravel wetlands? He thinks a chloride management plan would be appropriate. This ravine is a blue-line stream on the USGS maps.

Mr. Mills, as to the narrative vs. model discrepancy, 0.123 acre is to be redeveloped. 0.27 acres of pervious will be revamped into pervious surface. The model is conservative. He's brought drainage maps for viewing. The existing buildings and walkways within the PUD are the existing impervious that will remain under the applicant's control. As for the waiver, infiltration practices are prohibited on fill sites. This is part of the state stormwater permit review for this project. He has reviewed it with DPW stormwater as well. MM, what if the waiver was not granted? Mr. Mills, we'd have to find a safe place for infiltration. JS, is the request for waiver is driven by fill soils? Mr. Mills, correct. As for larger storms, we did examine the 100 year storm. It is waivable for the state permit. JS, why? Mr. Mills, this site is less than 10 acres of impervious. MW, is the pond designed for the 10-year storm? Mr. Mills, yes. The sizing for the 100-year event is conservative so that overflow will go down the designated spillway. Mr. von Turkovich, he's happy to adopt a protocol for chloride management if the city has one. We don't have a protocol to show you tonight.

MM to Mr. Torizzo, what's the issue with chloride? Mr. Torizzo, there's no regulation yet managing how much salt is applied to a site. The constructed wetlands will not treat it. Effective management and application is key to limiting impacts. DM mentioned the chloride TMDL from New Hampshire. Keeping track of quantity of use and frequency of application are important considerations.

MM, is a stream alteration permit needed? Mr. Mills does not think so. He will check with VT Rivers Program. DM noted there are many different versions of USGS maps. More info is needed to determine if a stream alteration permit is needed. JS, the city raised this question in Environmental Court when litigating the mini-storage facility on Flynn Avenue.

Mr. Torizzo, will the applicant look at the impacts of large storm events on the receiving ravine? Will there be an increase in peak discharge? Mr. Mills, there will be a slight increase in flows at the discharge point.

SM, do you consider your discharge into waters of the state or into private infrastructure? Mr. Mills, discharging into a wetland – waters of the state.

____, Riverwatch (board of directors), what responsibility does the applicant have to us downstream? MM, it may be a private matter between landowners and the stormwater permit requirements. SM, it's a valid point most properly addressed with VT DEC. If Riverwatch's stormwater inputs are affected by this project, DEC should take a look. MM, are there other drainages into the gully? Mr. Torizzo, yes, at least one other.

Brenda Orr, neighbor on Fletcher Place, is concerned about contaminants in the parking lot runoff. She is also dismayed by the very steep grade next to abutting residential properties. The soils are sandy and very unstable. She has a hard time believing that the trees to be retained along the top of the ravine can actually be retained in light of the proposed construction. There is too much impact too close to neighbors. She's concerned about chain link fencing that could be installed around the stormwater wetland. Lastly, she doesn't see why waivers should apply to this project.

MW, provide an example of a similar wetland treatment system in Burlington. Mr. Mills, there isn't one that he knows of. The permanent water is a requirement of the proposed system. SM, what about tree removal? SG, proposed tree clearing needs to be addressed as part of the application.

DM, can he presume that up to the 100-year storm, the pond will be stable? Mr. Mills, yes, the primary spillway will convey up to the 100-year storm. Geo-web will be used for enhanced stability. We will be required to certify the installation as part of the state stormwater permit.

JS, how will maintenance equipment access the facility? Mr. Mills, stabilized access is provided for in the design.

A MOTION was made by MW and SECONDED by DL:

Support the project as proposed.

Discussion:

DM, the applicant does not yet have DPW or State permits. He's a little reluctant to recommend approval. There's the issue of downstream impacts that needs to be addressed.

DL, we could condition that significant changes come back to BCB. JS agrees. We shouldn't be dictating order of permits for the applicant.

SG said there is a mechanism for revamped projects to return for review. He also said his understanding from BCB was that projects should be reviewed by DPW but not yet acted on before BCB review. That allows for BCB comment to be reflected in project design before its finalized.

DM, offers amendments:

The impact of flow volume and sediment load on downstream structures should be considered, whether by DEC or otherwise. There should be analysis of effects on downstream structures and associated mitigation if necessary. There should be no undue adverse effect. JS, he's not sure how this board would evaluate such a study. He's hesitant to require such study independent of the state requirements. If these comments are made available to DEC, they will look into impacts onto the downstream stormwater pond. DM, include a condition that the aforementioned permits be obtained.

Vote: 8-0-0, motion carried.

3.17-0643CA/MA; 400 Pine St (Ward 5S, ELM) Howard Space Partnership

Demolish 2 warehouse building and construct new mixed use building

Kevin Worden, Doug Viehmann, James Unsworth, and Hannah Wingate appeared on behalf of this application.

Doug Viehmann overviewed the project site. The combined sewer runs by the site. Existing structures will be demolished. The new building will have parking underneath. Two existing residential units will be retained in the new building. Other space will be for artists' lofts. Office space will be offered in the top floor. Rain gardens will be provided adjacent to the building.

Hannah Wingate stated that the site discharges into the combined system. The separate system is some 300' from the site. If extended in the future, the project could be converted to discharge into the separate system. Nearly 1,700 sf impervious surface will be eliminated. DM, what will it be replaced with? Mr. Viehmann, grassy area. Ms. Wingate, trenches and catch basins will intercept stormwater runoff. A proposed detention tank will collect roof runoff.

Ms. Wingate noted that ½ of impervious surface is considered, as well as all existing lawn areas, in the pre-development conditions. SM noted that this is DPW precedent, not a standard. When we have projects going to the combined sewer, we're not hitting the mark at this level.

Mr. Viehmann noted that 5 bike parking spaces are required. We're providing 15. He also noted that "urban soils" will need to be dealt with. Testing will be done to determine extent of conditions. Geotech analysis is needed for foundation details.

DL, the soils should be checked to see if infiltration is possible.

SM, the 50% precedent is a pretty generous bonus for redevelopment when designing stormwater management. When you can infiltrate, do so. If the holding capacity can be increased, do so.

MW, what would a 300' extension cost to get the project out of the CS now? Ms. Wingate, doesn't know. MW, soils borings are pretty important, and they should be done before you get to us. As for the demolition, do you know if there will be issues with lead or asbestos? Mr. Viehmann, there's no asbestos. Some lead paint is anticipated. Testing will be done. Soils are the next item on the applicant's list.

DM, do you have a plan in place if all of the soils are contaminated? Mr. Viehmann, yes, worst case would cost \$250K to remove all of it and send to the landfill. That would require some project adjustments.

ZR, alleyway could use some improvement to enhance the pedestrian experience. Mr. Viehmann and James Unsworth addressed outdoor public art space and related amenities. There is a sidewalk along the building. They have tried to make the alley more inviting to pedestrians and less so for vehicles.

Kevin Worden, at DRB, we will be asking for a continuation of the parking wavier for this property. He'd like the Board's support for doing so. Mr. Unsworth clarified that the extent of the wavier would actually decrease to 41%.

DL, will the brick be salvaged? Mr. Viehmann, it's a very soft brick, but if folks want it, they are welcome to use what they can.

A MOTION was made by SM and SECONDED by DM:

Support the application and encourage the applicants to enhance their stormwater management design. Try to higher the bar from the minimum 50% baseline.

MM, commends providing three times the minimum bike parking requirement.

Vote: 8-0-0, motion carries.

Adjournment

The meeting adjourned at 7:52 PM.