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DEPARTMENT OF
PLANNING & ZONING



Memorandum

To: City Market
Project File

Date: April 29, 2016

Project #: 57843.01

From: Marla Keene, P.E.

Re: City Market South End Stormwater Basis of Design

The City Market South End Project located on Flynn Ave in Burlington, Vermont, proposes to construct a new approximately 34,000 gross square foot grocery store, a 114 space parking lot, and associated landscape areas and access drives. The Project is located partially within the Lake Champlain watershed, partially within the Englesby Brook watershed, and partially within the watershed captured by the City of Burlington combined sewer system. Englesby Brook is included on the State of Vermont 303(d) List of Waters, Part A (2010) for stormwater. Therefore, the proposed stormwater management system is designed to meet the stormwater treatment requirements of the Vermont Stormwater Management Rule for Stormwater Impaired Waters (Chapter 22 of the Environmental Protection Rules) and applicable criteria of the Vermont Stormwater Management Manual (VSMM). The Project will be submitting an application for coverage under the State individual stormwater permit program, and will also be submitting a Stormwater Management Plan to the City of Burlington in accordance with Chapter 26 of the City Code. This memorandum discusses the applicability of the State and City Treatment Standards and how the Project proposes to address them. The values presented herein are draft and may change slightly between the writing of this memorandum and submission of the individual permit application, however it is VHB's belief the overall stormwater management approach will remain the same.

Existing Conditions Stormwater

As the 2.8 acre site exists today, approximately 1.4 acres drain towards Lake Champlain, approximately 0.6 acres drain towards Englesby Brook, and the remaining approximately 0.8 acres drain to the combined sewer system. Each receiving water has its own challenges associated with stormwater. Lake Champlain is impaired for phosphorus, a component in urban stormwater runoff. Englesby Brook is impaired by stormwater, a surrogate pollutant used to address an array of runoff related impairments. The combined sewer system suffers from combined sewer overflow events, attributable to stormwater runoff events exceeding the capacity of the treatment plant. The proposed stormwater treatment plan for the Project seeks to mitigate these conditions to the greatest extent possible.

Proposed Conditions Stormwater

In general, the Project will meet the applicable State stormwater management standards by reduction of impervious cover, treatment in two rain gardens, and detention of stormwater flows from the building roof and loading dock area. The following tables summarize the stormwater treatment and flow rate improvements resulting from the proposed design.

Existing	2.71
Proposed	2.11
% Change	-28%



	1-Year 24-hour Event			10-Year 24-hour Event		
	Existing	Proposed	% Change	Existing	Proposed	% Change
Englesby Brook	1.58	0.38	-76%	2.52	0.65	-74%
Combined Sewer	2.56	0.18	-93%	4.00	0.37	-91%
Lake Champlain	4.91	4.20	-14%	7.58	6.76	-11%

Existing	0.00 acres
Proposed	1.36 acres

Summary of State of Vermont Stormwater Treatment Standards

The current Vermont Stormwater Treatment Standards and their applicability to the Project are summarized in the below table. The Project consists mostly of redevelopment of existing impervious surfaces. This analysis provides a basis for design of the Project stormwater management practices.

Standard	Project Approach
Water Quality Volume	This standard is to provide 80-percent TSS removal from 20-percent of redeveloped impervious surfaces and 100-percent of new impervious surfaces. This standard will be addressed by the Project by reduction of impervious surfaces, and additional water quality treatment will be provided by two rain gardens located within the parking lot. Reduction of impervious cover is summarized in Table 1 above.
Recharge	This standard intends to preserve existing water table elevations by matching existing groundwater recharge characteristics, and only applies to new impervious cover where pervious cover previously existed. Recharge is prohibited on sites with contaminated soils, therefore the recharge standard will be waived for this Project. Stormwater features will be prevented from recharging into contaminated soils by the use of underdrains.
Channel Protection	This standard is to protect stream channels from degradation by providing extended detention of the one-year, 24-hour rainfall event, and only applies to new impervious cover where pervious cover previously existed. This standard does not apply to projects expanding impervious coverage by less than one acre.



Table 4: State Stormwater Treatment Standard Applicability	
Standard	Project Approach
Overbank Flood	This standard requires matching peak flow rates for the 10-year event to protect receiving water stability, and only applies to new impervious cover where pervious cover previously existed. The Project will match or reduce peak flow rates at each of its three proposed discharge points by inclusion of in-line subsurface detention pipes capturing flow from the building roof and loading dock area. Flows from the subsurface detention pipes will be detained by means of a passive outlet control structure contained within a manhole. Flow rates are summarized in Table 2 above.
Extreme Flood	This standard requires matching peak flow rates for the 100-year event to protect receiving water stability, and only applies to new impervious cover where pervious cover previously existed. This standard is not applicable to projects with less than 10-acres of impervious surfaces.

Summary of City of Burlington Stormwater Treatment Goals

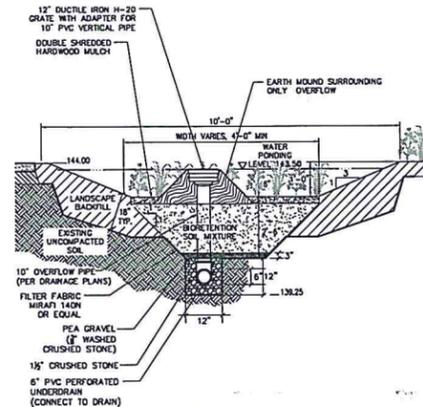
On January 26, 2016, VHB met with representatives from the City of Burlington’ Stormwater Program to review the Project, its constraints, and the City’s preferred stormwater management approach. Since this Project is located within three watersheds, the management goals vary by watershed. For Lake Champlain, water quality improvement is a priority. For Englesby Brook, water quality and 1-year peak flows are a priority. For the combined sewer, peak flows are a priority.

By reducing total drainage area and runoff to both Englesby Brook and the combined sewer as shown in Table 2 above, the Project meets the goals of improving water quality in Englesby Brook and reducing flows in Englesby Brook and the combined sewer. By providing treatment for flows discharging to Lake Champlain in two rain gardens located adjacent to the proposed parking lot, the Project meets the goals of improving water quality in Lake Champlain.

VHB reviewed the Project design with the City of Burlington Stormwater Manager on March 25, 2016, after completing preliminary stormwater design, and received concurrence that the design generally meets the City’s stormwater management goals. The Project will provide a Stormwater Management Plan in accordance with the requirement outlined in the City’s “Stormwater Management Plan Submission Requirements” to supplement its local permit applications.

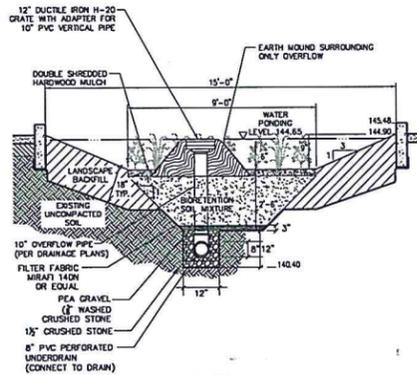
Conclusion

Through reduction in impervious cover, re-configuration of on-site drainage patterns to route flow away from Englesby Brook and the combined sewer system, biological and filtering treatment in rain gardens, and subsurface stormwater detention, the Project will comply with the State Stormwater Treatment Standards and the goals of the City’s stormwater management program.



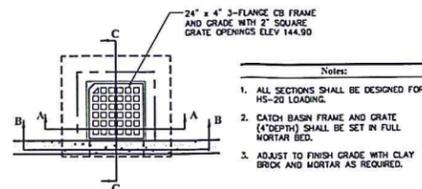
- Notes:
1. INSTALL UNDERDRAIN IN CENTER PER PLAN.
 2. SIDE SLOPES SHALL BE 3:1
 3. PLACEMENT OF UNDERDRAIN VARIES WITHIN CRUSHED STONE. SEE PLANS

Western Rain Garden with Subdrain 6/08
N.T.S. Source: VHB REV LD_302

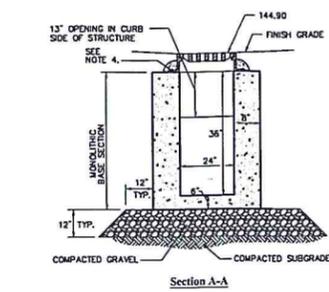


- Notes:
1. INSTALL UNDERDRAINS AT 4.25 FEET ON CENTER PER PLANS.
 2. SIDE SLOPES SHALL BE 3:1
 3. PLACEMENT OF UNDERDRAIN VARIES WITHIN CRUSHED STONE. SEE PLANS

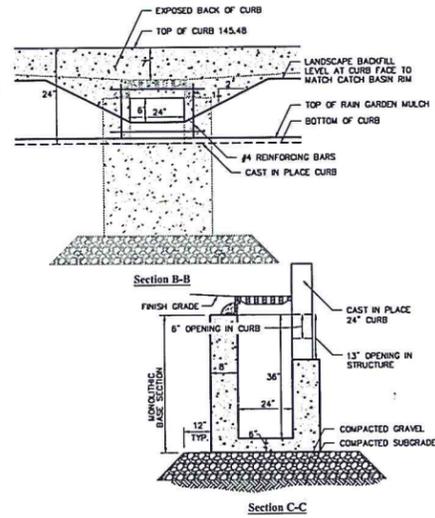
Central Rain Garden with Subdrain 6/08
N.T.S. Source: VHB REV LD_302



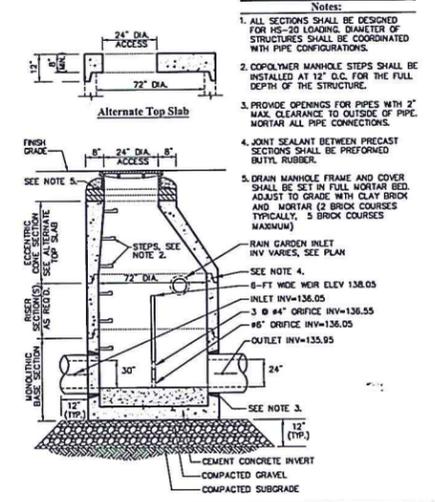
- Notes:
1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
 2. CATCH BASIN FRAME AND GRATE (4"X20") SHALL BE SET IN FULL MORTAR BED.
 3. ADJUST TO FINISH GRADE WITH CLAY BRICK AND MORTAR AS REQUIRED.



Rain Garden Curb Inlet 4/16
N.T.S. Source: VHB REV



Rain Garden Curb Inlet 4/16
N.T.S. Source: VHB REV



Drain Manhole #3 (DMH#3) 4/11
N.T.S. Source: VHB REV LD_115

PROGRESS SET - NOT FOR CONSTRUCTION

fff
freeman | french | freeman
40 IDX Dr
Building 100 Suite 200
South Burlington, VT 05403
802.497.6100

CITY MARKET SOUTH END

Burlington, Vermont

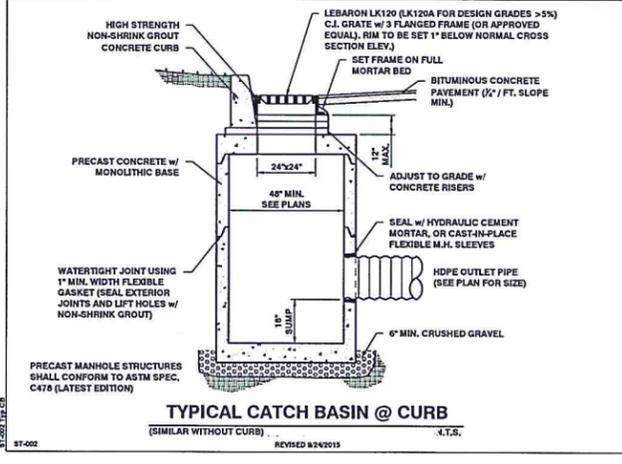
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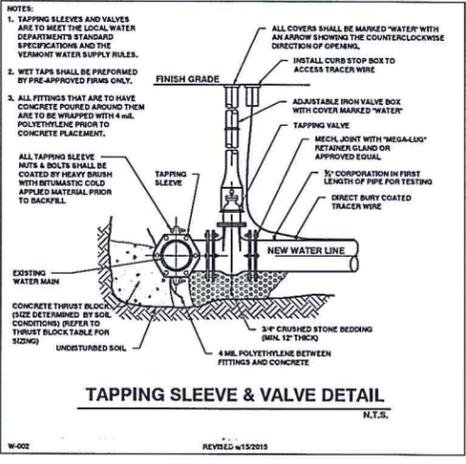
PROJECT NO.	A1536.00
DATE	04/14/16
SCALE	N.T.S.
DRAWN BY	MHK
CHECKED BY	VHB
DESIGN DEVELOPMENT	04/15/2016

DRAINAGE DETAILS

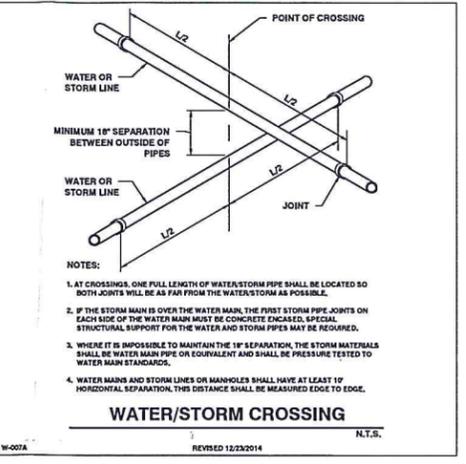
C4.1



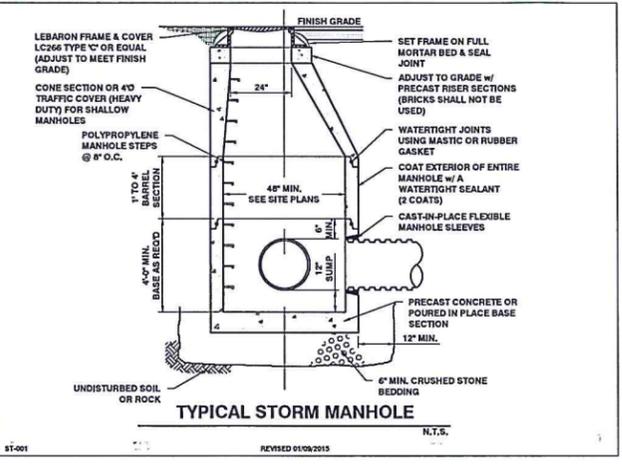
TYPICAL CATCH BASIN @ CURB
N.T.S.



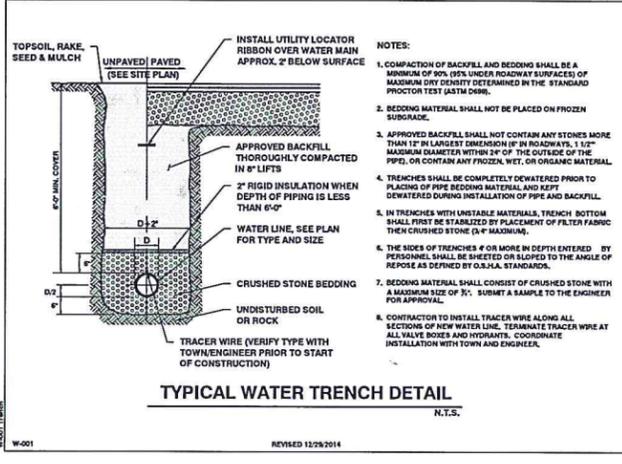
TAPPING SLEEVE & VALVE DETAIL
N.T.S.



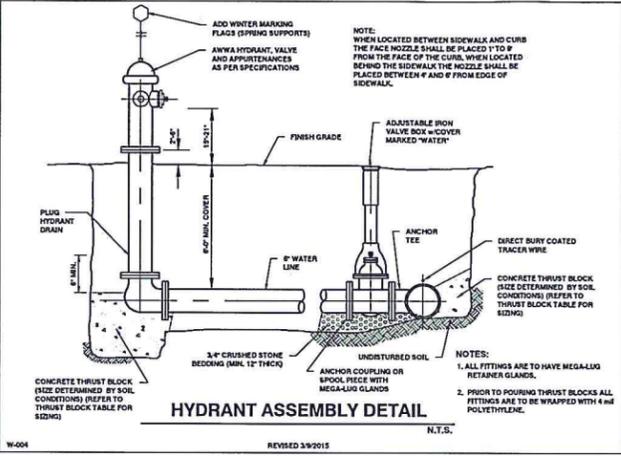
WATER/STORM CROSSING
N.T.S.



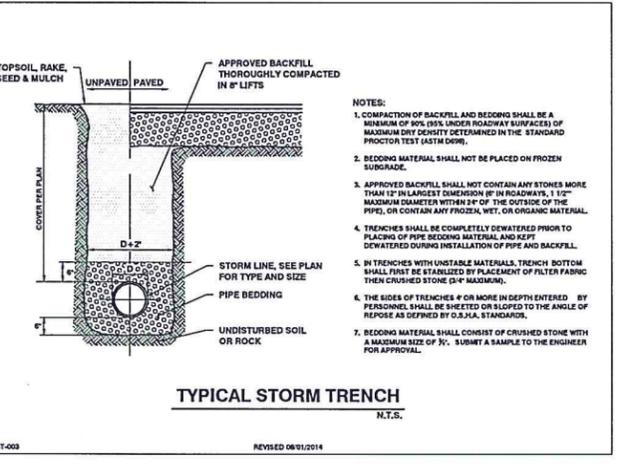
TYPICAL STORM MANHOLE
N.T.S.



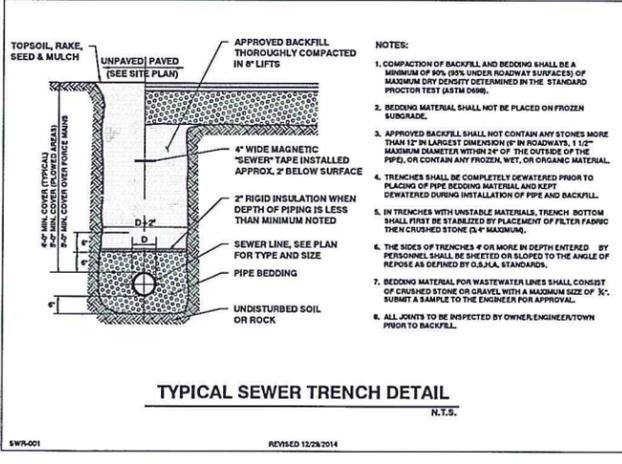
TYPICAL WATER TRENCH DETAIL
N.T.S.



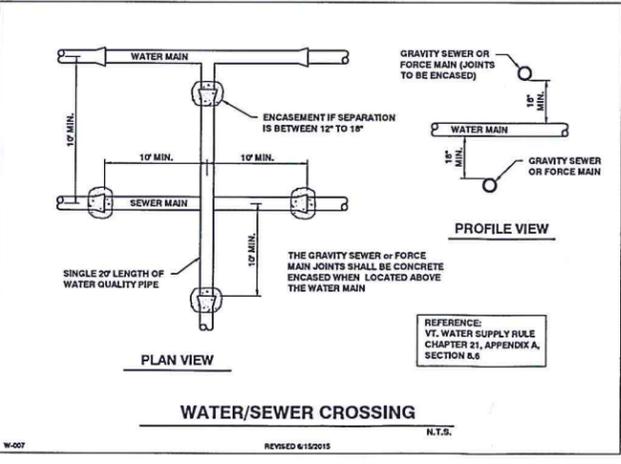
HYDRANT ASSEMBLY DETAIL
N.T.S.



TYPICAL STORM TRENCH
N.T.S.



TYPICAL SEWER TRENCH DETAIL
N.T.S.



WATER/SEWER CROSSING
N.T.S.

Potential Source of Contamination and other Siting Limitations

Potential Source of Contamination and other Siting Limitations	Separation Distance
Roadway, Parking Lot (outer edge of shoulder)	25'
Driveway (less than 3 residences)	15'
Sewage System Disposal Fields	50'
Subsurface Wastewater Piping and Related Tanks	50'
Property Line	100'
Limit of Herbicide Application on Utility R.O.W.	100'
Surface Water	100'
Flood ways	5'
Buildings	10'
Concentrated Livestock Holding Area & Manure Storage Systems	200'
Hazardous or Solid Waste Disposal Site	L
Non-sewage Wastewater Disposal Fields	L

a. See Table 11-2, FIG 11-1 of VT WATER SUPPLY RULE, CH. 21
 b. Increased to 50' when adjacent to agricultural cropland.
 c. Applies to rights-of-way (ROW) where herbicides have been applied in the past 12 months or may be applied in the future. This distance may be increased to 200' depending on the active ingredient in the herbicide according to Vermont Regulations for Control of Pesticides.
 d. For Public water sources, see Appendix A, part 3, Subpart 3.3.B.
 e. Water sources shall not be located in a flood way.
 f. If a water source is potentially downgradient of a source of contamination, then the Agency shall apply the criteria in 11.4.2.2.

VERMONT WATER SUPPLY RULE - CHAPTER 21
TABLE A11-1 - REQUIRED MINIMUM SEPARATION DISTANCES

VERMONT WATER SUPPLY RULE - CHAPTER 21
TABLE A11-1 - REQUIRED MINIMUM SEPARATION DISTANCES

PROGRESS
SET -
NOT FOR
CONSTRUCTION

fff
 Freeman | French | Freeman
 81 Hope Street - Burlington
 802-664-6844
 Architects • Planners • Engineers
 SITE ENGINEER:
 J. A. [Signature]
 J.A. [Signature]
 CIVIL ENGINEERING ASSOCIATE, INC.
 100 W. [Address]
 BURLINGTON, VT 05401
 802-249-7700

CITY
MARKET
SOUTH END

Burlington,
Vermont

PROJECT NO:
15253

DATE: 04/06/16
SCALE: NTS

DESIGNED BY: GAC
CHECKED BY: SAV

DATE: 02/12/2016
SCHEMATIC DESIGN: 04/15/2016

DETAILS

C3.2

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