STORMWATER MANAGEMENT REPORT
39 LAMARTINE STREET
WORCESTER, MASSACHUSETTS
June 6, 2024

Prepared for:
POLAR VIEWS, LLC
89 WEST MAIN STREET UNIT 101
NORTHBOROUGH, MASSACHUSETTS 01532

Prepared by:
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118 TURNPIKE ROAD SUITE 200
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Project Number:
G-647
Worcester, Massachusetts

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DRAINAGE NARRATIVE

Design Methods and Objectives

The following drainage analysis has been prepared in accordance with the most current rules and regulations of the City of Worcester, Massachusetts. Watershed areas were calculated for both the pre-development and post-development conditions. Existing and proposed ground cover conditions as well as tourain slopes were evaluated. Based upon the increased peak runoff from pre-development to the post development, storm water management systems were designed to attenuate the post development peak flows and runoff to be less than or equal to the pre-development rates of runoff. These calculations were performed using Hydrocad Stormwater Modeling Software for determining peak runoff and sizing detention/infiltration facilities for the 2, 10, 25 and 100 year storm event frequencies. Runoff hydrographs are calculated using the SCS Runoff equation and the SCS unitless hydrograph.

Existing Site Conditions

The existing site conditions were analyzed to determine tributary site runoff areas, flow patterns, slopes, impervious areas, open space including lawn areas, as well as existing soil types. The drainage area that was analyzed includes the site at 39 Lamartine Street to be redeveloped. The existing study area includes bituminous concrete pavement, and limited lawn area. The total tributary drainage area is 18,154 sq.ft (0.42 acres). The total impervious area in the predevelopment condition is 17,804 sq.ft. (0.41 ac). The existing slopes on site range from 2-5%. The site currently drains towards Meade Street.

Existing soils located on site were determined to be Urban land. Urban land does not have a separate hydrologic group but was conservative assigned Group C based on the disturbed nature of existing soils in the area.

Proposed Site Conditions

In the post development condition, the property is proposed to be redeveloped with a mixed used building consisting of 36 residential units and 1,581 sq.ft. of commercial space, along with access driveways garage parking. The total impervious area in the post development condition is 15,986 sq.ft. (0.37 acres). The total percentage of impervious area in the post development condition is 88.1%. The remaining portion of the site are to be lawn or landscaped.

The proposed site drainage consists of one subcatchment area “Subcatchment P1”. This runoff is directed toward Meade Street as it does in the existing condition. New driveway runoff is directed into a CDS treatment unit to provide 80% TSS removal.

The proposed drainage design for this development of this site meets or exceeds all requirements by the City of Worcester and the Department of Environmental Protection to the maximum extent practical. As the calculations demonstrate the proposed drainage design provides attenuation of peak rates and volumes of runoff, improves the quality of site runoff that flows offsite by achieving a minimum of 80% TSS for new pavement areas. drainage design as proposed will improve the quality of runoff that currently exists on this site.

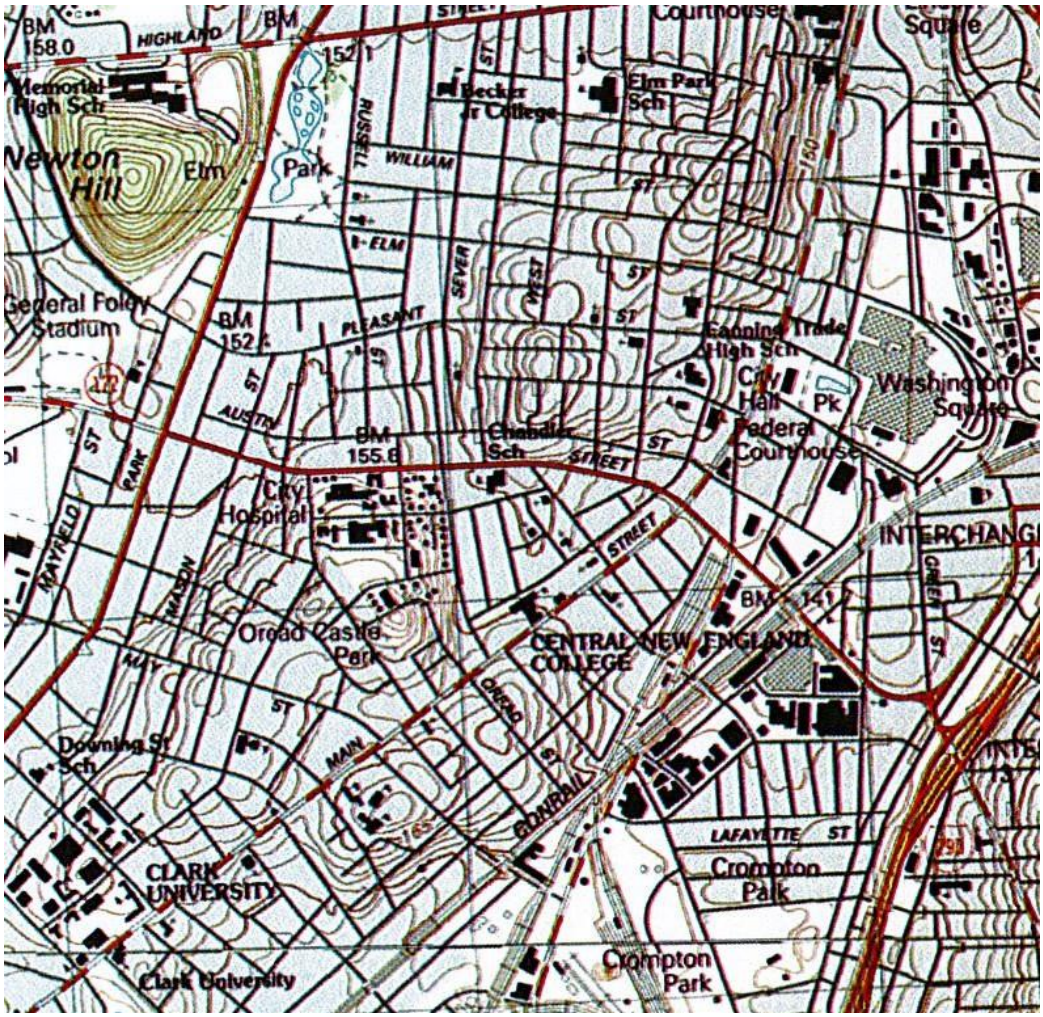
Drainage Analysis Summary

Pre-Development Drainage Reach (1R) - Existing Conditions Site Runoff to East

Post-Development Drainage Reach (1R) – Post-Development Site Runoff to East

Note: (Peak Flow Rate in cfs)

	2 Year	10 Year	25 Year	100 Year
Storm Intensity	**3.81 inches**	**5.96 inches**	**7.68 inches**	**10.60 inches**
Pre-Development (1R) To East	**1.51**	**2.38**	**3.07**	**4.24**
Post-Development (1R) To West	**1.45**	**2.33**	**3.03**	**4.21**
Reduction From Pre-Development to Post-Development				
To East (1R)	**-0.06**	**-0.05**	**-0.04**	**-0.03**

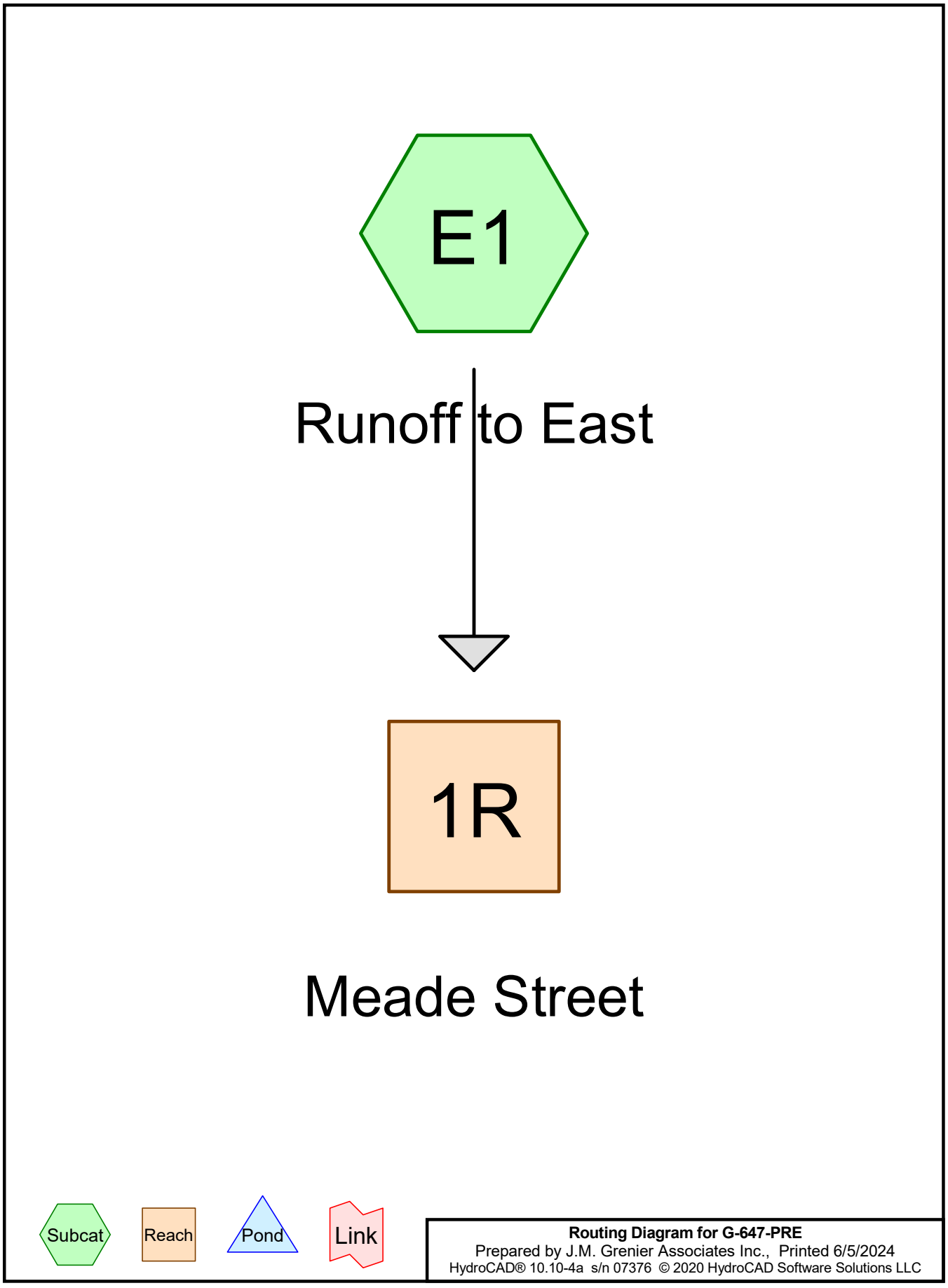


LOCUS PLAN

Source: USGS Quadrangles for
Worcester North, MA
7.5 x 15 minute series (metric)
Scale: 1:25,000 or 1" = 2083.33'

39 Lamartine Street
Worcester, Massachusetts

Prepared by: J.M. GRENIER ASSOCIATES – Southborough, MA



Routing Diagram for G-647-PRE
Prepared by J.M. Grenier Associates Inc., Printed 6/5/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.409	98	Impervious (E1)
0.008	74	Lawn, Good, HSG C (E1)
0.417	**98**	**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Runoff to East Runoff Area=18,154 sf 98.07% Impervious Runoff Depth>3.33"
Flow Length=178' Tc=6.0 min CN=98 Runoff=1.51 cfs 0.116 af

Reach 1R: Meade Street Inflow=1.51 cfs 0.116 af
Outflow=1.51 cfs 0.116 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.116 af Average Runoff Depth = 3.33"
1.93% Pervious = 0.008 ac 98.07% Impervious = 0.409 ac

Summary for Subcatchment E1: Runoff to East

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.116 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.81"

	Area (sf)	CN	Description
*	17,804	98	Impervious
*	350	74	Lawn, Good, HSG C
	18,154	98	Weighted Average
	350		1.93% Pervious Area
	17,804		98.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	178		0.49		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 98.07% Impervious, Inflow Depth > 3.33" for 2-YR event
Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.116 af
Outflow = 1.51 cfs @ 12.09 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Runoff to East Runoff Area=18,154 sf 98.07% Impervious Runoff Depth>5.29"
Flow Length=178' Tc=6.0 min CN=98 Runoff=2.38 cfs 0.184 af

Reach 1R: Meade Street Inflow=2.38 cfs 0.184 af
Outflow=2.38 cfs 0.184 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.184 af Average Runoff Depth = 5.29"
1.93% Pervious = 0.008 ac 98.07% Impervious = 0.409 ac

Summary for Subcatchment E1: Runoff to East

Runoff = 2.38 cfs @ 12.09 hrs, Volume= 0.184 af, Depth> 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.96"

	Area (sf)	CN	Description
*	17,804	98	Impervious
*	350	74	Lawn, Good, HSG C
	18,154	98	Weighted Average
	350		1.93% Pervious Area
	17,804		98.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	178		0.49		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 98.07% Impervious, Inflow Depth > 5.29" for 10-YR event
Inflow = 2.38 cfs @ 12.09 hrs, Volume= 0.184 af
Outflow = 2.38 cfs @ 12.09 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Runoff to East Runoff Area=18,154 sf 98.07% Impervious Runoff Depth>6.85"
Flow Length=178' Tc=6.0 min CN=98 Runoff=3.07 cfs 0.238 af

Reach 1R: Meade Street Inflow=3.07 cfs 0.238 af
Outflow=3.07 cfs 0.238 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.238 af Average Runoff Depth = 6.85"
1.93% Pervious = 0.008 ac 98.07% Impervious = 0.409 ac

Summary for Subcatchment E1: Runoff to East

Runoff = 3.07 cfs @ 12.09 hrs, Volume= 0.238 af, Depth> 6.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=7.68"

	Area (sf)	CN	Description
*	17,804	98	Impervious
*	350	74	Lawn, Good, HSG C
	18,154	98	Weighted Average
	350		1.93% Pervious Area
	17,804		98.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	178		0.49		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 98.07% Impervious, Inflow Depth > 6.85" for 25-YR event
Inflow = 3.07 cfs @ 12.09 hrs, Volume= 0.238 af
Outflow = 3.07 cfs @ 12.09 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Runoff to East Runoff Area=18,154 sf 98.07% Impervious Runoff Depth>9.50"
Flow Length=178' Tc=6.0 min CN=98 Runoff=4.24 cfs 0.330 af

Reach 1R: Meade Street Inflow=4.24 cfs 0.330 af
Outflow=4.24 cfs 0.330 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.330 af Average Runoff Depth = 9.50"
1.93% Pervious = 0.008 ac 98.07% Impervious = 0.409 ac

Summary for Subcatchment E1: Runoff to East

Runoff = 4.24 cfs @ 12.09 hrs, Volume= 0.330 af, Depth> 9.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=10.60"

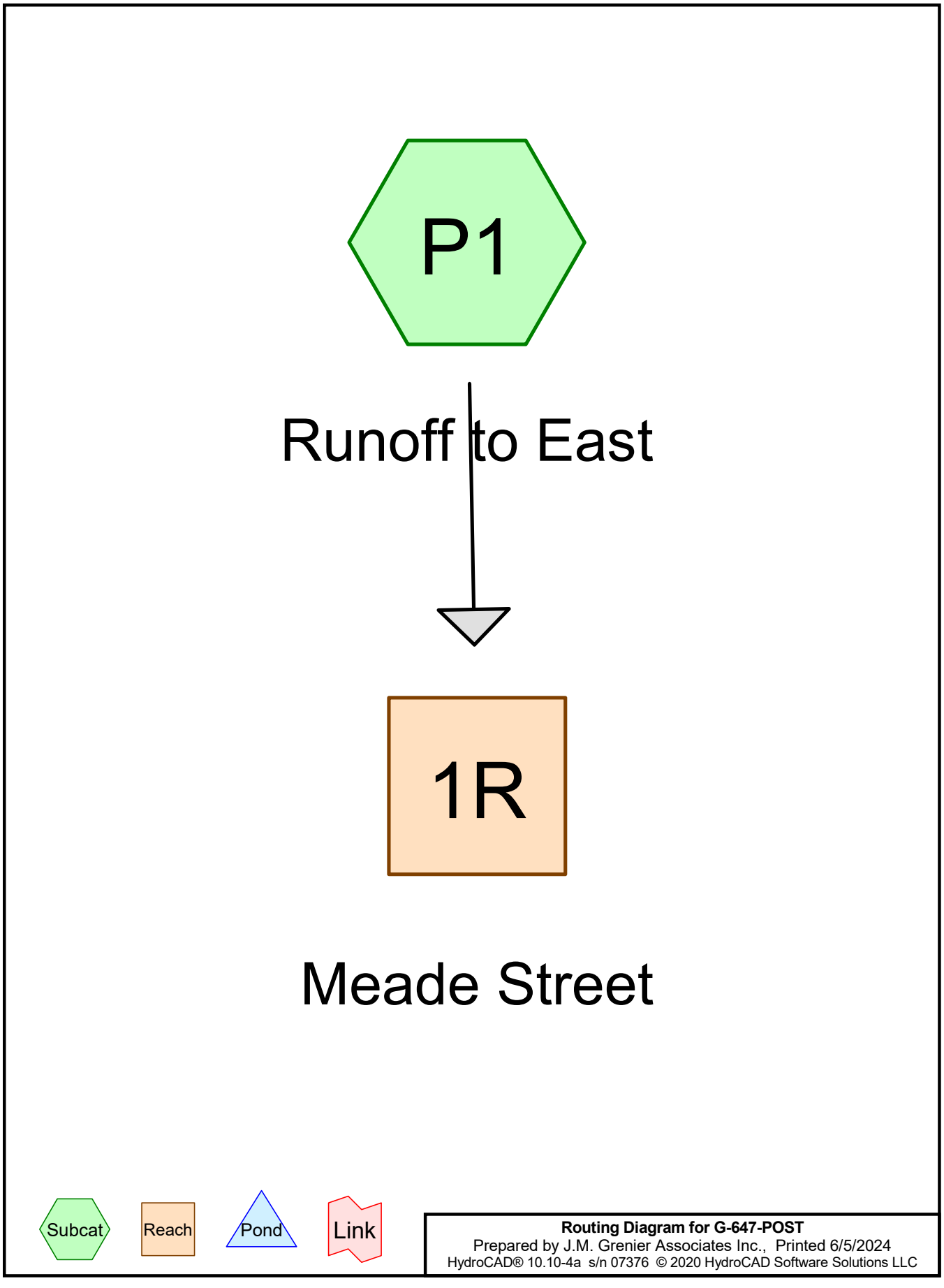
	Area (sf)	CN	Description
*	17,804	98	Impervious
*	350	74	Lawn, Good, HSG C
	18,154	98	Weighted Average
	350		1.93% Pervious Area
	17,804		98.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	178		0.49		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 98.07% Impervious, Inflow Depth > 9.50" for 100-YR event
Inflow = 4.24 cfs @ 12.09 hrs, Volume= 0.330 af
Outflow = 4.24 cfs @ 12.09 hrs, Volume= 0.330 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Routing Diagram for G-647-POST
Prepared by J.M. Grenier Associates Inc., Printed 6/5/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.367	98	Impervious (P1)
0.050	74	Lawn, Good, HSG C (P1)
0.417	**95**	**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Runoff to East Runoff Area=18,154 sf 88.06% Impervious Runoff Depth>3.06"
Flow Length=200' Tc=6.0 min CN=95 Runoff=1.45 cfs 0.106 af

Reach 1R: Meade Street Inflow=1.45 cfs 0.106 af
Outflow=1.45 cfs 0.106 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.106 af Average Runoff Depth = 3.06"
11.94% Pervious = 0.050 ac 88.06% Impervious = 0.367 ac

Summary for Subcatchment P1: Runoff to East

Runoff = 1.45 cfs @ 12.09 hrs, Volume= 0.106 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.81"

	Area (sf)	CN	Description
*	15,986	98	Impervious
*	2,168	74	Lawn, Good, HSG C
	18,154	95	Weighted Average
	2,168		11.94% Pervious Area
	15,986		88.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	200		0.56		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 88.06% Impervious, Inflow Depth > 3.06" for 2-YR event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 0.106 af
Outflow = 1.45 cfs @ 12.09 hrs, Volume= 0.106 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Runoff to East Runoff Area=18,154 sf 88.06% Impervious Runoff Depth>5.05"
Flow Length=200' Tc=6.0 min CN=95 Runoff=2.33 cfs 0.175 af

Reach 1R: Meade Street Inflow=2.33 cfs 0.175 af
Outflow=2.33 cfs 0.175 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.175 af Average Runoff Depth = 5.05"
11.94% Pervious = 0.050 ac 88.06% Impervious = 0.367 ac

Summary for Subcatchment P1: Runoff to East

Runoff = 2.33 cfs @ 12.09 hrs, Volume= 0.175 af, Depth> 5.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.96"

	Area (sf)	CN	Description
*	15,986	98	Impervious
*	2,168	74	Lawn, Good, HSG C
	18,154	95	Weighted Average
	2,168		11.94% Pervious Area
	15,986		88.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	200		0.56		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 88.06% Impervious, Inflow Depth > 5.05" for 10-YR event
Inflow = 2.33 cfs @ 12.09 hrs, Volume= 0.175 af
Outflow = 2.33 cfs @ 12.09 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Runoff to East Runoff Area=18,154 sf 88.06% Impervious Runoff Depth>6.63"
Flow Length=200' Tc=6.0 min CN=95 Runoff=3.03 cfs 0.230 af

Reach 1R: Meade Street Inflow=3.03 cfs 0.230 af
Outflow=3.03 cfs 0.230 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.230 af Average Runoff Depth = 6.63"
11.94% Pervious = 0.050 ac 88.06% Impervious = 0.367 ac

Summary for Subcatchment P1: Runoff to East

Runoff = 3.03 cfs @ 12.09 hrs, Volume= 0.230 af, Depth> 6.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=7.68"

	Area (sf)	CN	Description
*	15,986	98	Impervious
*	2,168	74	Lawn, Good, HSG C
	18,154	95	Weighted Average
	2,168		11.94% Pervious Area
	15,986		88.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	200		0.56		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 88.06% Impervious, Inflow Depth > 6.63" for 25-YR event
Inflow = 3.03 cfs @ 12.09 hrs, Volume= 0.230 af
Outflow = 3.03 cfs @ 12.09 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Runoff to East Runoff Area=18,154 sf 88.06% Impervious Runoff Depth>9.30"
Flow Length=200' Tc=6.0 min CN=95 Runoff=4.21 cfs 0.323 af

Reach 1R: Meade Street Inflow=4.21 cfs 0.323 af
Outflow=4.21 cfs 0.323 af

Total Runoff Area = 0.417 ac Runoff Volume = 0.323 af Average Runoff Depth = 9.30"
11.94% Pervious = 0.050 ac 88.06% Impervious = 0.367 ac

Summary for Subcatchment P1: Runoff to East

Runoff = 4.21 cfs @ 12.09 hrs, Volume= 0.323 af, Depth> 9.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=10.60"

	Area (sf)	CN	Description
*	15,986	98	Impervious
*	2,168	74	Lawn, Good, HSG C
	18,154	95	Weighted Average
	2,168		11.94% Pervious Area
	15,986		88.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	200		0.56		**Direct Entry, Segment 1**

Summary for Reach 1R: Meade Street

Inflow Area = 0.417 ac, 88.06% Impervious, Inflow Depth > 9.30" for 100-YR event
Inflow = 4.21 cfs @ 12.09 hrs, Volume= 0.323 af
Outflow = 4.21 cfs @ 12.09 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

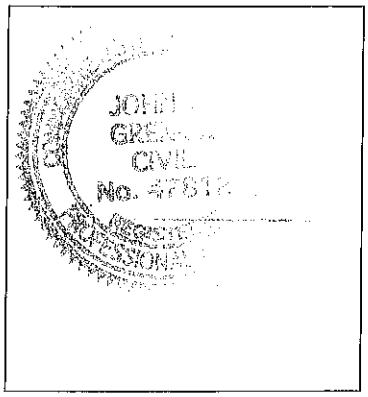
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



John M Green 5-5-2024
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☒ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

☐ Limited Project

☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.

☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area

☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff

☐ Bike Path and/or Foot Path

☒ Redevelopment Project

☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

STORMWATER MANAGEMENT CALCULATIONS

	Existing	Proposed	Change
Pavement/Walks:	17,804 sq.ft. /0.409 ac.	4,212 sq.ft. /0.097 ac.	-13,592 sq.ft. /0.312 a
Building:	0 sq.ft. /0.000 ac.	11,774 sq.ft. /0.270 ac.	+11,774 sq.ft. /0.270 ac.
Total	17,804 sq.ft. /0.409 ac.	15,986 sq.ft. /0.367 ac	-1,818 sq.ft. /0.042 ac

Standard #3: Recharge to Groundwater

Recharge not possible due to lack of available space on site to provide recharge.

Drawdown within 72 hours

N/A – Not Applicable

Standard #4: Water Quality

Treatment for water quality provided by CDS unit.

CDS Sizing

DMH 1: Q = (qu)(A)(WQV) = (752 csm/hr)(0.04 ac)(0.0015625 sq.mi/acre)(1-inch) = 0.05 cfs
TC = 6 min = 0.1 hrs

STORMWATER NARRATIVE

Design Methods and Objectives

The design of this redevelopment has been prepared in accordance with Stormwater Management Standards to the maximum extent practical as outlined in the Stormwater Management Handbook. In particular, the site has been designed to ensure:

1. No new stormwater conveyances will discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. All new pavement runoff is treated by a CDS unit prior to discharge.

2. Stormwater management systems are designed so that the post-development peak discharge rated does not exceed pre-development peak discharge rates. Drainage calculations demonstrate that the peak rate of runoff is reduced in the post development condition through a reduction in impervious area.

3. On-site recharge is not practical for this redevelopment due to lack of available on-site area. Loss of annual recharge to ground water is minimized by reducing the amount of impervious area in the post development conditions.

4. Stormwater management systems are designed to remove a minimum of 80% TSS. The CDS treatment unit. provides a minimum of 80% TSS removal.

5. The use of the site for a mixed use residential and retail building is not a risk for producing higher pollutant loads. Notwithstanding, the treatment of runoff from this portion of the site will ensure treatment of any potential pollutants.

6. The site is not in a critical area.

7. This project is a redevelopment and stormwater management guidelines are met to the maximum extent practical.

8. For construction related activities, an operation and maintenance plan has been incorporated into the Stormwater Management Report to ensure that a protocol for runoff control is in place prior to any construction activities.

9. The operation and maintenance plan as provided provides a protocol to ensure that the stormwater management system will function as designed.

10. A signed illicit discharges statement has been included in the Stormwater Management Report.

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: 39 Lamartine Street, Worcester

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
CDS Unit	0.80	**1.00**	0.80	0.20

Total TSS Removal = 80 %

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: G-647

Prepared By: DCT

Date: 6/6/24

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Hydrodynamic Separation Product Calculator

39 Lamartine Street

39 Lamartine Street

CDS 2015-4

Project Information					
Project Name	39 Lamartine Street			**Option #**	A
Country	UNITED_STATES	**State**	Massachusetts	**City**	Worcester

Contact Information			
First Name	John	**Last Name**	Grenier
Company	J.M. Grenier Associates Inc.	**Phone #**	617-590-3268
Email	jmgrenier@townisp.com		

Design Criteria					
Site Designation	39 Lamartine Street			**Sizing Method**	Net Annual
Screening Required?	No	**Drainage Area (ac)**	0.04	**Peak Flow (cfs)**	0.30
Groundwater Depth (ft)	5 - 10	**Pipe Invert Depth (ft)**	0 - 5	**Bedrock Depth (ft)**	>15
Multiple Inlets?	No	**Grate Inlet Required?**	No	**Pipe Size (in)**	6.00
Required Particle Size Distribution?	No	**90° between two inlets?**	N/A	**180° between inlet and outlet?**	No
Runoff Coefficient	0.90	**Rainfall Station**	70 - East Brimfield Lake, MA	**TC (Min)**	10

Treatment Selection					
Treatment Unit	CDS	**System Model**	2015-4		
Target Removal	80%	**Particle Size Distribution (PSD)**	125	**Predicted Net Annual Removal**	99.56%

CONTECH ENGINEERED SOLUTIONS

Hydrodynamic Separation Product Calculator

39 Lamartine Street

39 Lamartine Street

CDS 2015-4

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD								
Rainfall Intensity[1] (in/hr)	% Rainfall Volume[1]	Cumulative Rainfall Volume	Rainfall Volume Treated	Total Flowrate (cfs)	Treated Flowrate (cfs)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.0400	15.15%	15.15%	15.15%	0.0014	0.0014	0.20%	100.00%	15.15%
0.0800	24.57%	39.72%	24.57%	0.0029	0.0029	0.41%	100.00%	24.57%
0.1200	13.70%	53.42%	13.70%	0.0043	0.0043	0.61%	100.00%	13.70%
0.1600	9.41%	62.83%	9.41%	0.0058	0.0058	0.83%	100.00%	9.41%
0.2000	6.63%	69.46%	6.63%	0.0072	0.0072	1.03%	100.00%	6.63%
0.2400	5.24%	74.70%	5.24%	0.0086	0.0086	1.23%	100.00%	5.24%
0.2800	4.78%	79.48%	4.78%	0.0101	0.0101	1.44%	100.00%	4.78%
0.3200	3.14%	82.62%	3.14%	0.0115	0.0115	1.64%	100.00%	3.14%
0.3600	2.71%	85.33%	2.71%	0.0130	0.0130	1.86%	100.00%	2.71%
0.4000	2.10%	87.43%	2.10%	0.0144	0.0144	2.06%	100.00%	2.10%
0.4800	2.47%	89.90%	2.47%	0.0173	0.0173	2.47%	100.00%	2.47%
0.5600	2.02%	91.92%	2.02%	0.0202	0.0202	2.89%	100.00%	2.02%
0.6400	1.42%	93.34%	1.42%	0.0230	0.0230	3.29%	100.00%	1.42%
0.7200	1.00%	94.34%	1.00%	0.0259	0.0259	3.70%	100.00%	1.00%
0.8000	1.07%	95.41%	1.07%	0.0288	0.0288	4.11%	100.00%	1.07%
1.0000	1.65%	97.06%	1.65%	0.0360	0.0360	5.14%	100.00%	1.65%
1.2000	0.93%	97.99%	0.93%	0.0432	0.0432	6.17%	100.00%	0.93%
1.4000	0.60%	98.59%	0.60%	0.0504	0.0504	7.20%	99.97%	0.60%
1.6000	0.49%	99.08%	0.49%	0.0576	0.0576	8.23%	99.76%	0.49%
1.8000	0.48%	99.56%	0.48%	0.0648	0.0648	9.26%	99.56%	0.48%
								99.56%
							Removal Efficiency Adjustment[2] =	
							Predicted % Annual Rainfall Treated =	99.56%
							Predicted Net Annual Load Removal Efficiency =	99.56%

1 - Based on 14 years of 15-minute rainfall data from NCDC Station 2107, East Brimfield Lake, Worcester County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

SECTION (_____)
STORM WATER TREATMENT DEVICE

1.0 GENERAL

1.1 This item shall govern the furnishing and installation of the CDS® by Contech Engineered Solutions LLC, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

1.2 The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

1.3 The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) shall be a CDS® device manufactured by:

Contech Engineered Solutions LLC
9025 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

1.4 Related Sections

1.4.1 Section 02240: Dewatering
1.4.2 Section 02260: Excavation Support and Protection
1.4.3 Section 02315: Excavation and Fill
1.4.4 Section 02340: Soil Stabilization

1.5 All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

1.6 The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

1.7 The SWTD manufacturer shall submit to the Engineer of Record a “Manufacturer’s Performance Certification” certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research

1.8 No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

2.0 MATERIALS

2.1 Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

- 2.1.1 Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
- 2.1.2 Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
- 2.1.3 Cement shall be Type III Portland Cement conforming to ASTM C 150;
- 2.1.4 Aggregates shall conform to ASTM C 33;
- 2.1.5 Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
- 2.1.6 Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
- 2.1.7 Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

2.2 Internal Components and appurtenances shall conform to the following:

- 2.2.1 Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;
- 2.2.2 Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;
- 2.2.3 Fiberglass components shall conform to applicable sections of ASTM D-4097
- 2.2.4 Access system(s) conform to the following:
- 2.2.5 Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

3.0 PERFORMANCE

3.1 The SWTD shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load with a particle size distribution having a mean particle size (d_{50}) of 125 microns unless otherwise stated.

3.2 The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this

subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

3.3 The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to minimize the probability of fine particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

3.4 The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

3.5 The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.6 The SWTD shall have completed field tested following TARP Tier II protocol requirements

4.0 EXECUTION

4.1 The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

4.2 The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

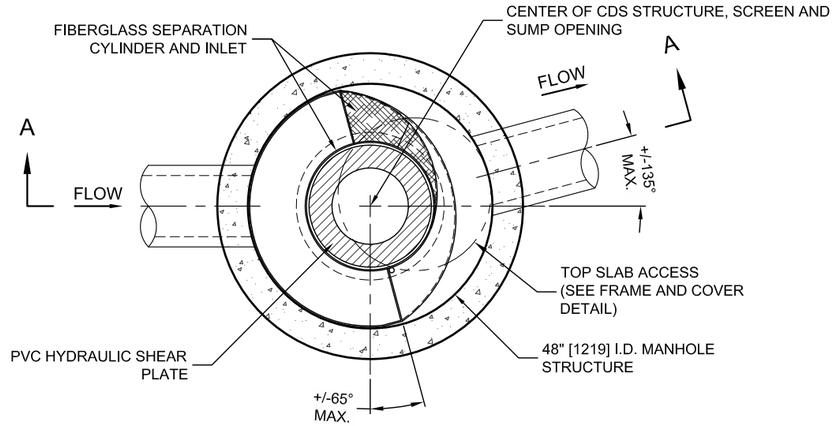
4.3 The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

4.4 The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

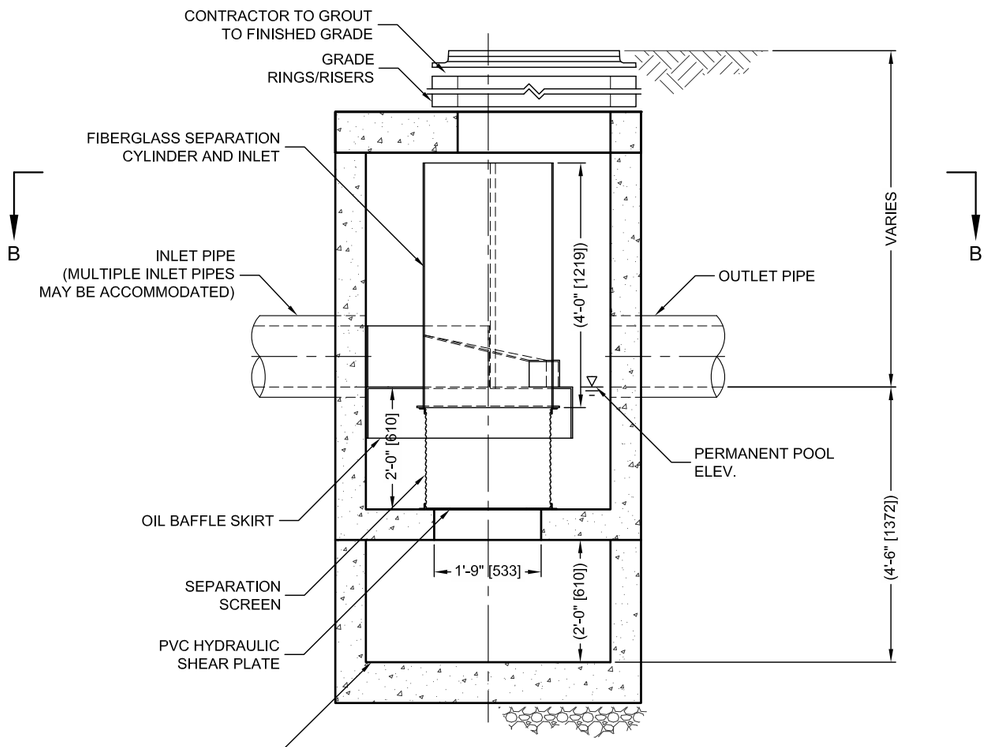
TABLE 1
Storm Water Treatment Device
Storage Capacities

CDS Model	Minimum Sump Storage Capacity $(yd^3)/(m^3)$	Minimum Oil Storage Capacity (gal)/(L)
CDS2015-4	0.9(0.7)	61(232)
CDS2015-5	1.5(1.1)	83(313)
CDS2020-5	1.5(1.1)	99(376)
CDS2025-5	1.5(1.1)	116(439)
CDS3020-6	2.1 (1.6)	184(696)
CDS3025-6	2.1(1.6)	210(795)
CDS3030-6	2.1 (1.6)	236(895)
CDS3035-6	2.1 (1.6)	263(994)
CDS3535-7	2.9(2.2)	377(1426)
CDS4030-8	5.6(4.3)	426(1612)
CDS4040-8	5.6 (4.3)	520(1970)
CDS4045-8	5.6 (4.3)	568(2149)
CDS5640-10	8.7(6.7)	758(2869)
CDS5653-10	8.7(6.7)	965(3652)
CDS5668-10	8.7(6.7)	1172(4435)
CDS5678-10	8.7(6.7)	1309(4956)
CDS7070-DV	3.6(2.8)	914 (3459)
CDS10060-DV	5.0 (3.8)	792 (2997)
CDS10080-DV	5.0 (3.8)	1057 (4000)
CDS100100-DV	5.0 (3.8)	1320 (4996)

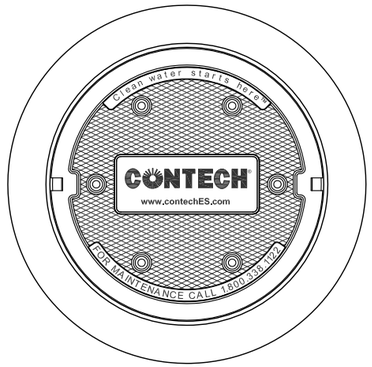
END OF SECTION



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

CDS2015-4-C DESIGN NOTES

THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS2015-4-C
INLINE CDS
STANDARD DETAIL

Project:	**G-647**	By:	**DCT**	Date: **6/6/2024**
Location:	**Worcester, Massachusetts**	Chkd:	**JMG**	Date: **6/6/2024**

Catchment Watershed Areas

Design Storm: **25** year

WA: **bldg**

	Area (Ac)		C		AxC			
Paved:	**0.27**	x	**0.9**	=	0.243	Overland Flow Time:	**5**	min.
Dense grass:		x		=		Intensity:	**7.6**	in/hr
TOTAL:	**0.27**	x	**0.90**	=	**0.24**	Flow (Q=AxCxi):	**1.8**	cfs

WA: **trench drain**

	Area (Ac)		C		AxC			
Paved:	**0.04**	x	**0.9**		0.036	Overland Flow Time:	**5**	min.
Dense grass:		x	**0.3**			Intensity:	**7.6**	in/hr
TOTAL:	**0.04**	x	**0.90**	=	**0.04**	Flow (Q=AxCxi):	**0.3**	cfs

WA:

	Area (Ac)		C		AxC			
Paved:		x				Overland Flow Time:		min.
Dense grass:		x				Intensity:		in/hr
TOTAL:		x		=		Flow (Q=AxCxi):		cfs

WA:

	Area (Ac)		C		AxC			
Paved:		x				Overland Flow Time:		min.
Dense grass:		x				Intensity:		in/hr
TOTAL:		x		=		Flow (Q=AxCxi):		cfs

WA:

	Area (Ac)		C		AxC			
Paved:		x				Overland Flow Time:		min.
Dense grass:		x				Intensity:		in/hr
TOTAL:		x		=		Flow (Q=AxCxi):		cfs

J.M. GRENIER ASSOCIATES

PIPE HYDRAULICS

DESIGN STORM: 25 yr.

LOCATION			AREA (Acres)		C	CxA	FLOW TO INLET	TIME IN PIPE	RAINFALL INTENSITY	FLOW ACTUAL	DESIGN												STATEMENT
STREET OR PROPERTY	FROM	TO	INCRE-MENTAL (A)	TOTAL (A)			(Min)	T= $(L/V_A)/60$ (Min)	(i)	Q_A=CxAxi	RIM ELEV UPPER END (Ft)	INV ELEV UPPER END (Ft)	RIM ELEV LOWER END (Ft)	INV ELEV LOWER END (Ft)	PIPE SIZE (Inches)	PIPE TYPE	PIPE LENGTH (Ft)	PIPE SLOPE (Ft/Ft)	n	VEL_{FULL} $V_F=\frac{1.49}{n}(R^{2/3})(S^{1/2})$	$FLOW_{FULL}$ $Q_F=V_F xA$	VEL_{ACTUAL} $V_A=(Q_A/Q_F)xVAR$	FREEFLOW OR SUBMERGED
Property	BLDG	Ex. DHM	0.27		0.90	0.24	5.0	0.0	7.6	1.8		446.00	449.44	444.34	8	PVC	23	0.072	0.013	9.3	3.3	9.5	FREEFLOW
Parking Lot	TRENCH	DMH-1	0.04		0.90	0.04	5.0	0.0	7.6	0.3	441.00	440.12	442.60	439.60	6	PVC	13	0.040	0.013	5.7	1.1	4.7	FREEFLOW
Parking Lot	DMH-1	PC		0.04		0.04	5.0	0.1	7.6	0.3	442.60	439.50	442.60	439.40	6	PVC	12	0.010	0.013	2.9	0.6	2.9	FREEFLOW

PROJECT_____
LOCATION_____
JOB NO._____
FILE NO._____

CALC BY_____
DATE_____
CHKD BY_____
DATE_____

OPERATION AND MAINTENANCE PLAN

39 Lamartine Street, Worcester
June 6, 2024

The following are operation and maintenance instructions for both construction and post-development stormwater controls. The goal of these plans is to ensure that the stormwater system, as designed, will function properly during construction and for the future of the site. The developer of the parcel is Polar Views, LLC. Daniel Yarnie is the contact for this project and can be contacted at the following number: (774) 303-9860.

Construction Operation and Maintenance Plan:

1. All erosion and sediment control devices installed prior to construction shall be inspected on a daily basis. Any deficiencies in the siltation fence shall be corrected immediately. Any accumulated silt shall be removed manually from the silt fence. Silt barrier should be inspected daily to ensure that there is no accumulation of sediments.

2. The most important aspects of controlling erosion and sedimentation are limiting the extent of disturbance and stabilizing surfaces as soon as possible. Of secondary importance in erosion control is limiting the size and length of the tributary drainage area within the work site and drainage structures. These fundamental principles shall be the key factor in the control of erosion on the site.

3. All disturbed surfaces shall be stabilized a minimum of 14 days after construction in any portion of the site has ceased or is temporarily halted unless additional construction is intended to be initiated within 21 days.

4. Hydroseeding and hay mulching shall be performed immediately after construction to minimize erosion damage. Newly seeded slopes shall be inspected every two weeks for the first few months to ensure that revegatation has occurred. Repairs and reseeding shall be performed immediately as the need arises.

5. The trench drain is to be covered with plywood prior to the installation of pavement. This will prevent excess silt from accumulating in pipes. After pavement has been installed, a block and gravel inlet protection device shall be constructed surrounding the trench drain. This will keep silt out of the drainage system until the remainder of the site has been stabilized. The stone from the inlet protection shall be maintained frequently to ensure the highest degree of filtration.

6. At no time shall silt laden water be allowed to enter sensitive areas (wetlands, and off-site areas). Any runoff from disturbed surfaces shall be directed through settling basins and erosion control barriers prior to entering any sensitive areas.

7. At the completion of construction all areas are to be loamed and seeded to ensure that the site is stabilized.

Post Development Operation and Maintenance Plan:

1. Seeding and repairs shall be performed as required. Sediment and debris shall be removed at least once a year, typically in early spring prior to the commencement of the growing season.

2. A contract with a licensed hauler shall be in place for maintenance of drainage structures to ensure the long term performance of the drainage system.

3. The driveways shall not be treated with sand.

4. The CDS treatment unit shall be inspected and cleaned with a vacuum truck when the total sediment depth in the unit reaches 75% of isolated sump depth or when an appreciable level of hydrocarbons and trash has accumulated. Bi-annual servicing is recommended however frequency of maintenance may be more or less based on local conditions. The following procedures should be taken cleaning out CDS units:

    a) Perform visual inspection to ensure system components are in working order and there are no blockages and obstructions in the inlet and separation screen.
    b) Measure pollutant accumulation with calibrated dipstick.
    c) Remove manhole covers and insert vacuum hose into sump
    d) System should be completely drained down and sump fully evacuated of sediment
    e) Area outside the screen should be cleaned out if pollutant buildup exists in this area
    f) Make sure manhole covers are secure following cleaning.
    g) Disposal of all material removed shall be done in accordance with local, state and Federal requirements.

5. The pump chamber shall be inspected yearly including floats and pumps. Pump maintenance shall follow manufacturer's recommendations.

6. The contractor will be responsible for the maintenance of all drainage structures and until such time as the site work is complete. The maintenance will then be the responsibility of the property owners.

LONG TERM POLLUTION PREVENTION PLAN

39 Lamartine Street, Worcester
June 6, 2024

This plan was developed in compliance with the Massachusetts Department of Environmental Protection Stormwater Requirements

Good Housekeeping

The proposed site is designed to maintain high quality water treatment for all runoff. A general maintenance plan has been prepared and will be followed in a strict and complete manner as required.

Spill Prevention Plan

No hazardous materials will be stored on site. However the flowing spill prevention plan will be incorporated into the Long Term Pollution Prevention Plan

1. Manufacturers recommended methods for spill cleanup will be clearly posted. Site personnel will be made aware of the procedures and location of the information and cleanup supplies.

2. Materials and equipment necessary for spill cleanup will be kept in the materials storage area. Equipment and materials will include, but is not limited to, brooms dust pans, mops, rags, gloves, sand and trash containers specifically for this purpose.

3. All spills will be cleaned up immediately after discovery.

4. The spill area will be kept will ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

5. Spills of toxic or hazardous material will be reported, regardless of size, to the Massachusetts Department of Environmental Protection (888) 304-1133

6. Should a spill occur, the spill prevention plan will be adjusted to include measures to prevent another spill and to cleanup the spill should another occur. A description of the spill along with the causes and cleanup measures will be included in the updated pollution prevention plan.

7. The construction superintendant responsible for daily operation on the site will be the spill prevention and cleanup coordinator. The superintendant will designate at least three site personnel to receive spill prevention cleanup training. The names of the responsible spill personnel will be posted in the material storage area.

Construction Sequencing

1. Selectively cut trees and clear brush to be chipped and hauled off site. Note that the site is in the Asian Longhorned Beetle (ALB) regulated area.

2. Stake location of and install erosion control barrier as delineated on site plan.

3. Strip top and subsoil as necessary in work area. Stockpile material on southern portion of lot for backfilling purposes at completion of construction.

4. Form and pour foundation for new building

5. Construct building and install utilities. Subsurface drainage system shall NOT be connected to parking lot drainage system until all tributary drainage areas are stabilized and there is no potential for silt laden water to enter the subsurface recharge chambers.

6. Install finish pavement, curbing and landscaping.

Construction Inspection & Maintenance Schedule

1. Hay bales and silt fence shall be inspected weekly and after storm events for damage and excessive silting. Damaged fence shall be replaced immediately.

2. Temporary construction entrance shall be inspected weekly and after heavy storm events or heavy use. The entrance shall be maintained in a condition that will prevent sediment tracking offsite. All sediment tracked onto Grosvenor, Lamartine or Meade Streets shall be swept up immediately

3. Stockpiled sediment shall be mulched if they are to remain for more than three weeks. The stockpiles shall be inspected weekly and after storm events for erosion damage. Additional mulch shall be added if needed.

4. Loamed and seeded area shall be inspected after final grading for areas that need to be reseeded of restabilized.

5. Temporary diversion swales shall be inspected weekly and after storm events for erosion damage and excessive silting. Silt shall be removed if necessary. Any erosion damage shall be repaired immediately.

6. The temporary construction basin shall be inspected weekly and after storm events for erosion damage and excessive silting.

Stormwater BMP Maintenance

A full BMP maintenance plan has been prepared (see Operation & Maintenance Plan) in order to ensure that the stormwater management system will function properly and as designed.

Landscape and Lawn Maintenance

Routine mowing and associated maintenance of all landscape features will occur weekly or as needed to prevent excessive growth of vegetation on site. Grass clippings and leaf litter shall not be blown into or disposed of in storm drainage systems or wetland resource areas.

Fertilizers, Herbicides & Pesticides

Fertilizer, herbicide & pesticide use will be limited to that typically associated with lawns. Use of slow release phosphorus fertilizers or no use or fertilizers is encouraged. All fertilizer, herbicide & pesticide use will comply with local, state and federal requirements.

Solid Waste Maintenance

Solid waste is handled on site and will comply with all local, state and federal requirements.

Pet Waste

Pet waste shall be property disposed of in a timely manner to prevent pollution of onsite stormwater management facilities and down-gradient areas.

Snow Disposal

Snow disposal shall not be directed toward wetland resource areas.

Winter Salt & Sand Use

All winter salt and/or sand will comply with all local, state and federal requirements.

Training of Staff

All personnel on site will be briefed on all requirements for implementing the Long Term Pollution Prevention Plan

Emergency Contact for Long Term Pollution Prevention Plan

Daniel Yarnie
Polar Views, LLC
89 West Main Street Unit 101
Northborough, MA 01532

ILLICIT DISCHARGE COMPLIANCE STATEMENT

39 Lamartine Street, Worcester
June 6, 2024

Responsibility:

The owner is responsible for the ultimate compliance with all provisions of the Massachusetts Stormwater Management Policy, the U.S. EPA NPDES Construction General Permit and responsible for identifying and eliminating illicit discharges (as defined by U.S. EPA).

Owner: Polar Views, LLC
89 West Main Street Unit 101
Northborough, MA 01532
(774) 303-9860

Owner's Compliance Statement

To the best of my knowledge, the attached plans, computations and specifications meet the requirements of Standard 10 of the Massachusetts Stormwater Handbook regarding illicit discharges to the stormwater management system and that no detectable illicit discharges exist on the site. All documents and attachments were prepared under my direction ad qualified personnel gathered and evaluation the information submitted, to the best of my knowledge.

Included with this statement are site plans, drawn to scale, that identify the location of systems for conveying stormwater on the site and show that these systems do not allow the entry of any illicit discharges into the stormwater management system. The plans also show any systems for conveying wastewater and/or groundwater on the site and show there are no connections between stormwater and wastewater systems.

Signature _____

Map Scale: 1:677 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 18, Sep 10, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	1.6	100.0%
Totals for Area of Interest		**1.6**	**100.0%**