DRAINAGE REPORT

For

1427 - 1449 Main Street
City of Weymouth, Massachusetts
Norfolk County

Prepared by:

BOHLER
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900 TEL.

Joshua G. Swerling, P.E.
Massachusetts P.E. Lic. # 41697

December 17, 2020

#W201012

TABLE OF CONTENTS

LIST OF TABLES

APPENDICIES

I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the development of a proposed senior living facility located at 1427 - 1449 Main Street in the City of Weymouth, Massachusetts. The site, which contains approximately 2.76 acres of land, contains existing buildings, paved parking areas, and associated landscaping.

The proposed project includes the construction of a new senior living facility along with new paved parking areas, landscaping, storm water management components, and associated utilities. This report addresses a comparative analysis of the pre- and post-development site runoff conditions. Additionally, this report provides calculations documenting the design of the proposed stormwater conveyance/management system as illustrated within the accompanying Proposed Site Plan Documents prepared by Bohler. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site.

On-Site Soil Information

The majority of the soils at the site are mapped as Merrimac fine sandy loam while the remaining soils are mapped as Urban land. Based off the data presented in the Preliminary Geotechnical Engineering Report prepared by McArdle Gannon Associates, Inc. (MGA) the site was modeled with Hydraulic Soil Group (HSG) A. Refer to **Appendix C** for additional information.

Design Point Descriptions

For the purposes of this analysis the pre- and post-development drainage conditions were analyzed at one (1) "design point" where stormwater runoff currently drains to under existing conditions.

Design Point #1 (DPE1) is the existing roadway located on the easterly side of the site (Main Street). Under existing conditions, this design point receives stormwater flows from approximately 3.019 acres of land, designated as watershed "E1". This watershed includes areas of pavement, wooded area, rooftop, and landscaping. This area has a calculated curve number of 61 and an assumed time of concentration of 6 minutes.

For the purposes of this analysis the pre- and post-development drainage conditions were analyzed at one (1) "design point" where stormwater runoff currently drains to under existing conditions. These design points are described in further detail in Section 2 below. A summary of the existing and proposed conditions peak runoff rates for the 2-, 10-, 25- and 100-year storms can be found in **Table 1.1** below.

Table 1.1: Design Point Peak Runoff Rate Summary*

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	1.21	0.53	**-0.680**	4.61	2.26	**-2.350**	7.20	2.93	**-4.270**	11.61	10.08	**-1.530**

**Flows are represented in cubic feet per second (cfs)*

II. EXISTING SITE CONDITIONS

Existing Site Description

The site consists of approximately 2.76 acres of land located at 1427 - 1449 Main Street in the City of Weymouth, Massachusetts. The current site contains existing buildings, paved parking areas, and associated landscaping.

Existing Collection and Conveyance

The entirety of the site drains to the roadway to the east (Main Street). Slopes on the site range from 1%-50%, however, most of the site is a consistent 2% parking lot. On-site elevations range from 179 feet at the southwest corner to 165 feet at the northeast corner.

The site was modeled as one (1) catchment for the existing conditions as described below. The time of concentration for this area is assumed as 6 minutes (0.1 hr) to be conservative.

Subcatchment E1 in total is 3.019 acres with rooftop, pavement, wooded area, and landscaping. This area flows overland from southwest to northeast towards Main Street.

III. PROPOSED SITE CONDITIONS

Proposed Development Site Conditions

The proposed project includes the construction of a new senior living facility along with new paved parking areas, landscaping, storm water management components and associated utilities. A portion of the site, including the proposed parking areas, has been designed to drain to deep sump hooded catch basins. The catch basins will capture and convey stormwater runoff, via an underground pipe system, to one of two proposed underground infiltration basins. Pretreatment of stormwater runoff will be provided by a combination of the deep sump hooded catch basins and a proprietary treatment unit or isolator row prior to discharge into the proposed basins. The inlet control structure (ICS-1) has been designed so that the invert to the isolator row is 0.10' below the manifold invert to ensure the first flush is sent directly to the isolator row for pretreatment. Roof runoff will also be relocated via a gutter system and conveyed to one of the underground infiltration basins as well. Similarly, area drains will collect stormwater throughout

the landscaped garden areas around the building and convey it to one of the underground infiltration basins. The remaining area will sheet flow overland towards Main Street.

The proposed drainage system has been designed to provide at least 80% removal of total suspended solids (TSS) in accordance with the Massachusetts DEP Stormwater Handbook. The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same design points described in **Section II** above.

Proposed Development Collection and Conveyance

Deep sump hooded catch basins are proposed to collect and route runoff from the paved parking areas to the proposed underground infiltration basins. Pipes have been designed for the 25-year storm using the Rational Method. Pipe sizing calculations are included in **Appendix F**.

The best management practices (BMPs) incorporated into the proposed stormwater management system have been designed to meet the TSS removal requirements as set forth in the Massachusetts Department of Environmental Protection Stormwater Handbook standards. Refer to **Appendix F** for calculations. In addition, a Stormwater Operation and Maintenance (O&M) Plan, attached in **Appendix G**, has been developed, which includes scheduled maintenance and periodic inspections of stormwater management structures.

The site was subdivided into four (4) separate subcatchments for the proposed conditions as described below. The minimum time of concentration for all proposed areas is calculated as 6 minutes (0.1 hr).

Subcatchment P1 consists of 0.94 acres of area consisting entirely of rooftop. This area drains to one of the underground infiltration systems, however, does not flow through the isolator row for pretreatment since roof runoff can be considered “clean” water and to not overtax the isolator row. A time of concentration of 6 minutes was used.

Subcatchment P2 consists of 1.24 acres of area consisting of pavement, wooded area and landscaping. This area drains to the isolator row prior to discharge into one of the underground infiltration systems. A time of concentration of 6 minutes was used.

Subcatchment P3 consists of 0.74 acres of area consisting of pavement, wooded area and landscaping. This area drains to the proprietary unit prior to discharge to one of the underground infiltration systems. A time of concentration of 6 minutes was used.

Subcatchment P4 consists of 0.09 acres of area consisting of pavement and landscaping. This area drains offsite towards Main Street. A time of concentration of 6 minutes was used.

The calculated proposed conditions peak rates of runoff are listed below in **Table 3.1**. For additional hydrologic information, refer to **Appendix E**.

IV. METHODOLOGY

Peak Flow Calculations

Methodology utilized to design the proposed stormwater management system includes compliance with the guidelines set forth in the latest edition of the Massachusetts DEP Stormwater Handbook. The pre- and post-development runoff rates being discharged from the site were computed using the HydroCAD computer program. The drainage area and outlet information were entered into the program, which routes storm flows based on NRCS TR-20 and TR-55 methods. The other components of the model were determined following standard NRCS procedures for Curve Numbers (CNs) and times of concentrations documented in the appendices of this report. The rainfall data utilized and listed below in table 4.1 below for stormwater calculations is based on NOAA. Refer to **Appendix F** for more information.

Table 4.1: Rainfall Intensities

Frequency	2 year	10 year	25 year	100 year
Rainfall* (inches)	3.36	5.12	6.22	7.92

Values derived from NOAA ATLAS on 10/30/2020

The proposed stormwater management as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year design storm events. Additionally, the proposed project meets, or exceeds, the MADEP Stormwater Management standards. Compliance with these standards is described further below.

V. STORMWATER MANAGEMENT STANDARDS

Standard #1: No New Untreated Discharges

The project has been designed so that proposed impervious areas (including the building roof and paved parking/driveway areas) shall be collected and passed through the proposed drainage system for treatment.

Standard #2: Peak Rate Attenuation

As outlined in **Tables 1.1, 2.1, 3.1, and 5.1**, the development of the site and the proposed stormwater management system, have been designed so that post-development peak rates of runoff as well as volume are below pre-development conditions for the 2-, 10-, 25- and 100-year storm events at Design Point DP1.

Standard #3: Recharge

The stormwater runoff from the project will be collected and diverted to two (2) proposed underground infiltration basins, resulting in recharge. The recharge volume provided in the proposed underground infiltration basins is 16,328 cf.

Standard #4: Water Quality

Water quality treatment is provided via deep sump catch basins, one (1) proprietary unit, one (1) isolator row and two (2) underground infiltration basin. TSS removal calculations are included in **Appendix F** of this report. Refer to **Appendix F** of this report for calculations documenting required and provided water quality volumes.

Standard #5: Land Use with Higher Potential Pollutant Loads

Not Applicable for this project.

Standard #6: Critical Areas

Not Applicable for this project.

Standard #7: Redevelopment

A portion of the site can be considered redevelopment. However, the entire site has been designed to meet the requirements for new development.

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

The proposed project will provide construction period erosion and sedimentation controls as indicated within the site plan set provided for this project. This includes a proposed construction exit, protection for stormwater inlets, protection around temporary material stock piles and various other techniques as outlined on the erosion and sediment control sheets. Additionally, the project is required to file a Notice of Intent with the US EPA and implement a Stormwater Pollution Prevention Plan (SWPPP) during the construction period. The SWPPP will be prepared prior to the start of construction and will be implemented by the site contractor under the guidance and responsibility of the project's proponent.

Standard #9: Operation and Maintenance Plan (O&M Plan)

An Operation and Maintenance (O&M) Plan for this site has been prepared and is included in **Appendix G** of this report. The O&M Plan outlines procedures and time tables for the long-term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction and periodic monitoring of the system components, in accordance with established practices and the manufacturer's recommendations. The O&M Plan includes a list of responsible parties.

Standard #10: Prohibition of Illicit Discharges

The proposed stormwater system will only convey allowable non-stormwater discharges (firefighting waters, irrigation, air conditioning condensation, etc.) and will not contain any illicit discharges from prohibited sources.

VI. SUMMARY

In summary, the proposed stormwater management system illustrated on the drawings prepared by Bohler results in a reduction in peak rates of runoff and volumes from the subject site when compared to pre-development conditions for the 2-, 10-, 25- and 100-year storm frequencies. In addition, the proposed best management practices will result in an effective removal of total

suspended solids from the post-development runoff. The pre-development versus post-development peak discharge rates comparisons are contained in **Table 5.1** below:

Table 5.1: Design Point Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	1.21	0.53	**-0.680**	4.61	2.26	**-2.350**	7.20	2.93	**-4.270**	11.61	10.08	**-1.530**

**Flows are represented in cubic feet per second (cfs)*

As outlined in the tables above, the proposed stormwater management system as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year storm events. Additionally, the project meets, or exceeds the MADEP Stormwater Management Standards as described further herein.

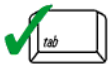
APPENDIX A: MASSACHUSETTS STORMWATER MANAGEMENT CHECKLIST

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.

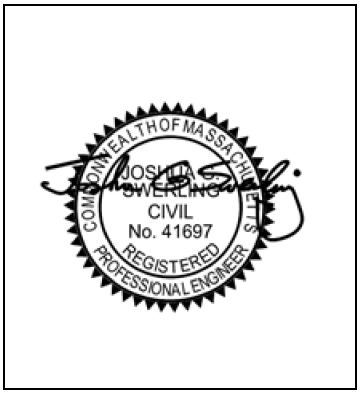
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



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): Underground Infiltration Basins

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.

APPENDIX B: PROJECT LOCATION MAPS

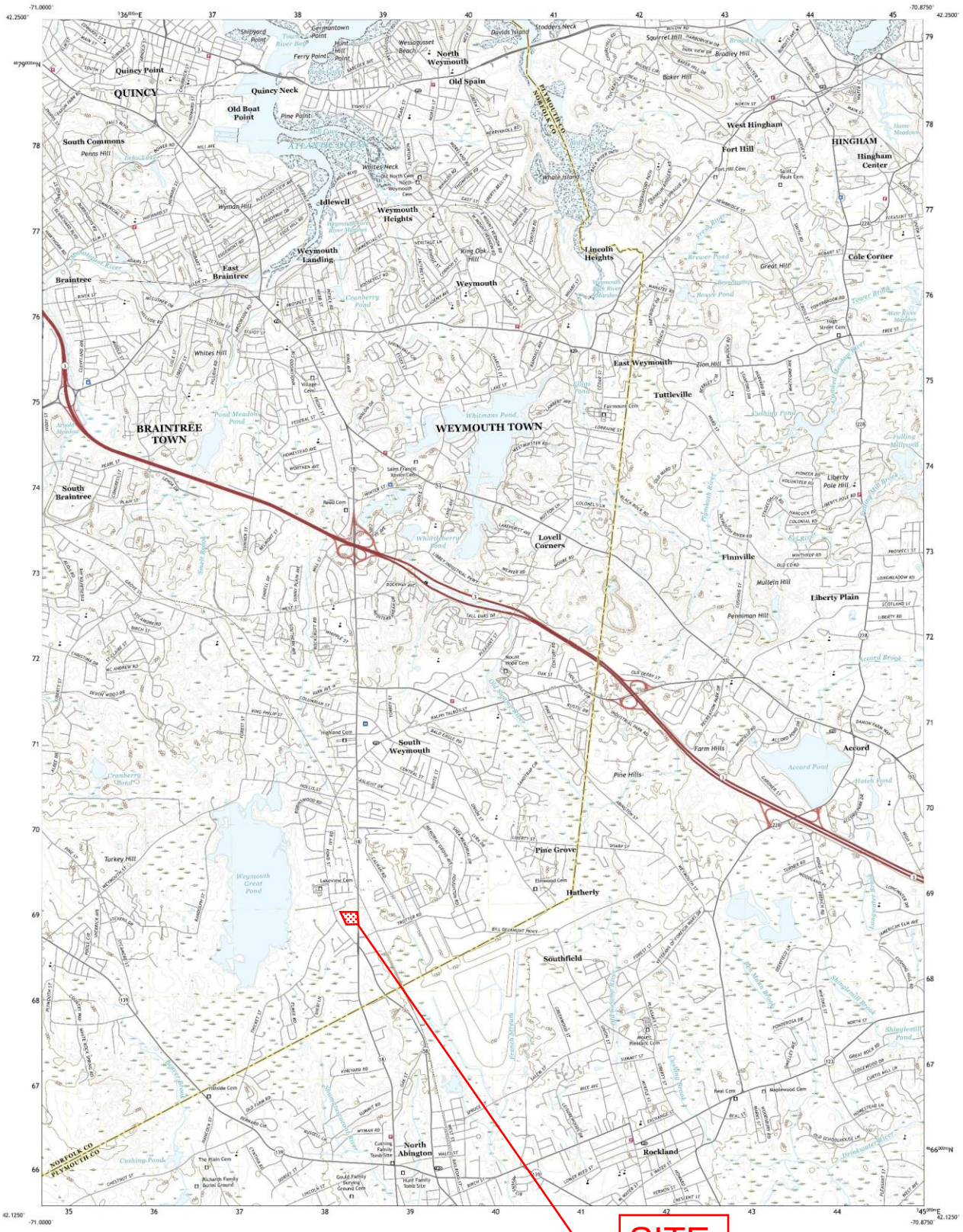
- *USGS MAP*
- *FEMA FIRMETTE*

USGS science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

WEYMOUTH QUADRANGLE
MASSACHUSETTS
7.5-MINUTE SERIES



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 19T
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery	NAIP,	July 2016	September 2016
Roads	U.S. Census Bureau,		2016
Names	GNIS,	1974 - 2018	
Hydrography	National Hydrography Dataset,		2005
Contours	National Elevation Dataset,		2012
Boundaries	Multiple sources; see metadata file	2016 -	2017
Wetlands	FWS National Wetlands Inventory	1992 -	2011

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

KILOMETERS 0 0.5 1 2
METERS 1000 0 1000 2000
MILES 0 0.5 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011. A metadata file associated with this product is draft version 0.6.18

ADJOINING QUADRANGLES
1 Boston South
2 Hull
3 Nantasket Beach
4 Blue Hills
5 Cohasset
6 Brockton
7 Whitman
8 Hanover

ROAD CLASSIFICATION
Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

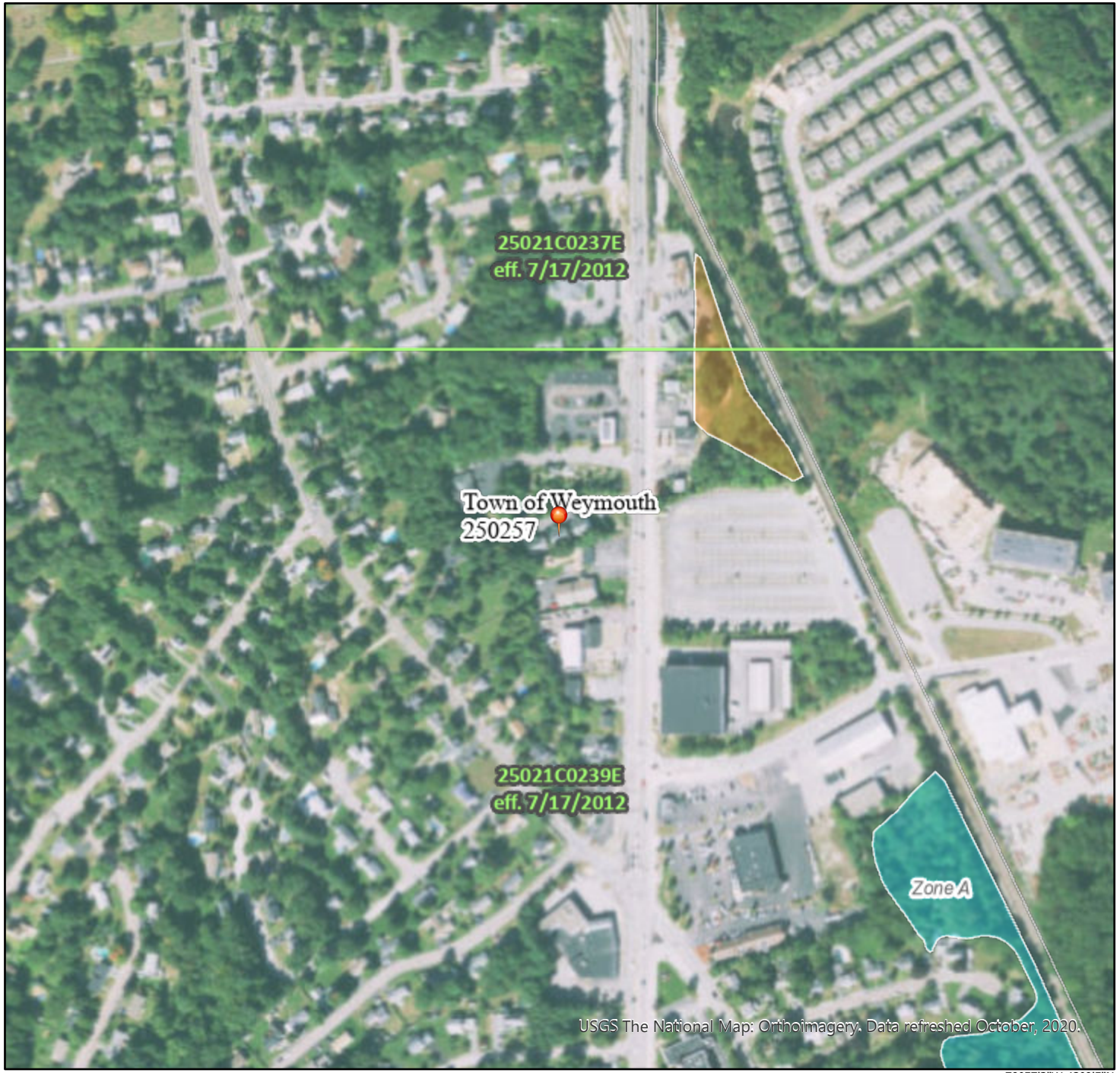
WEYMOUTH, MA
2018

NSN 7643015926805
NGA REF NO. USGS24K48005

National Flood Hazard Layer FIRMette

FEMA

70°57'40"W 42°9'31"N



70°57'3"W 42°9'5"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/28/2020 at 4:09 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX C: SOIL AND WETLAND INFORMATION

- *NCRS CUSTOM SOIL RESOURCE REPORT*
- *SOIL TESTING RESULTS*

Map Scale: 1:1,410 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:25,000.

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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

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

Date(s) aerial images were photographed: Aug 26, 2014—Sep 4, 2014

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	6.4	81.8%
602	Urban land, 0 to 15 percent slopes		1.4	18.2%
Totals for Area of Interest			**7.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

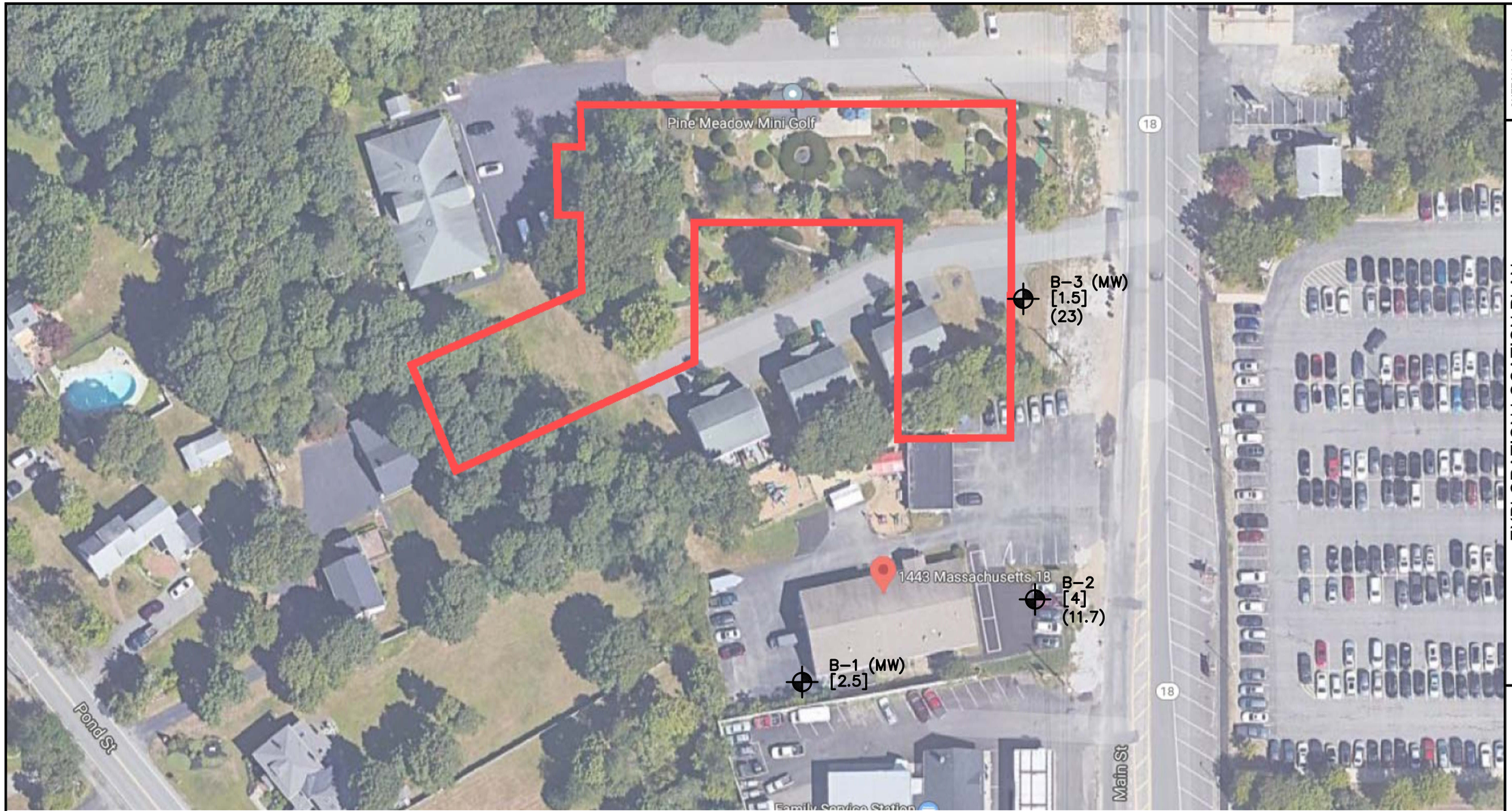
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



LEGEND:

⊕	TEST BORINGS PERFORMED BY TECHNICAL DRILLING SERVICES OF STERLING, MA ON AUGUST 24, 2020.
[2.5]	INDICATES APPROXIMATE DEPTH IN FEET OF BOTTOM OF EXISTING FILL AT BORING LOCATION.
(23)	INDICATES APPROXIMATE DEPTH IN FEET OF REFUSAL AT BORING LOCATION, WHERE ENCOUNTERED.

NOTES:

1. BASE PLAN DEVELOPED FROM A GOOGLE MAPS IMAGE.
2. THE BORING LOCATIONS SHOWN WERE DETERMINED BY TAPING AND/OR PACING FROM EXISTING SITE FEATURES. BORING LOCATIONS ARE APPROXIMATE.
3. MGA AND PES ASSOCIATES OBSERVED AND LOGGED BORINGS SHOWN.

SCALE: 1"=50'

0 25 50 100

EXPLORATION LOCATION PLAN

PROPOSED SENIOR HOUSING BUILDING
1435-1449 MAIN STREET, WEYMOUTH, MASSACHUSETTS

PROJECT: W0821 | DATE: 08/2020 | SCALE: AS NOTED | DRAWN: RED | CHECKED: SLH

SKETCH NO.: FIG. No. 2

McArdle Gannon Associates, Inc.
MGA Engineers & Consultants
300 Oak Street, Suite 460
Pembroke, MA 02359
781.826.0040 phone
781.735.0418 fax

APPENDIX B: SOIL TEST BORING LOGS

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING B-1 (MW)

PROJECT: Senior Housing Building - 1435-1449 Main Street, Weymouth, MA
CLIENT: Atlantic Development
CONTRACTOR: Technical Drilling Services

MGA NO. : W0821
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION :
DATE START : 08/24/2020
END : 08/24/2020
DRILLER : Gary Caouette
ENGINEER : Sherry Holmes

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HSA	Split Spoon	----
8/24/20	09:15am	16	15	17	Size I.D.	4-1/4"	1-3/8"	----
8/26/20		18.9	MW		Hammer Wt.	----	140#	- - - -
					Hammer Fall	----	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS	Well Schematic
0							-0.3	-ASPHALT-	
			10 12 13 9	S-1	0.5 2.5	12	0.3	Medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt. -FILL-	
			8 11 52 20	S-2	2.5 4.5	14	-2.5 2.5	Dense, gray-brown, fine to coarse GRAVEL and fine to coarse SAND, trace (-) Silt.	
4									
			13 25 28 100/4"	S-3	5.0 6.8	8		Very dense, gray-brown, fine to coarse GRAVEL, some fine to coarse Sand, trace Silt. [Very difficult augering through numerous cobbles/boulders within the sand and gravel soils]	
8									
			18 26 38 48	S-4	10.0 12.0	12		Very dense, gray-brown, fine to coarse SAND and fine to coarse GRAVEL, trace (-) Silt. [Bottom 4±" moist]	
12								-SAND & GRAVEL-	
			29 28 55 13	S-5	15.0 17.0	14		Very dense, wet, gray-brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt.	
16									
20								[Augered to 22 feet to install monitoring well]	
							-22.0		
							22.0	BOTTOM OF BORING AT 22 FEET	

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

SUMMARY
Overburden:
Rock:
Samples:

BORING B-1 (MW)

300 Oak Street, Suite 460 Pembroke, MA 02359 | Telephone 781.826.0040 | Fax 781.735.0418 | mcardlegannon.com

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING B-2

PROJECT: Senior Housing Building - 1435-1449 Main Street, Weymouth, MA
CLIENT: Atlantic Development
CONTRACTOR: Technical Drilling Services

MGA NO. : W0821
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION :
DATE START : 08/24/2020
END : 08/24/2020
DRILLER : Gary Caouette
ENGINEER : Sherry Holmes

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HSA	Split Spoon	----
8/24/20	12:30pm	NE (1)	11	11.7	Size I.D.	4-1/4"	1-3/8"	----
					Hammer Wt.	----	140#	- - - -
					Hammer Fall	----	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recovery (in)	Elevation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0							-0.2	-ASPHALT-
			9 11 23 29	S-1	0.5 2.5	12	0.2	Dense, brown to dark brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, trace Red Brick. -FILL-
4							-4.0 4.0	[Very difficult augering through numerous cobbles/boulders within the sand and gravel soils]
			75/0"	S-2	5.0 5.0	0		[Split spoon refusal] -SAND & GRAVEL-
8								
			27 30 31 50/2"	S-3	10.0 11.8	14		Very dense, gray-brown, fine to coarse SAND, some (+) fine to coarse Gravel, trace (-) Silt.
12							-11.7 11.7	[Auger refusal at 11 feet on probable boulder] BOTTOM OF BORING AT 11.7 FEET (1) 'NE' = Not Encountered
16								
20								

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING B-2

300 Oak Street, Suite 460 Pembroke, MA 02359 | Telephone 781.826.0040 | Fax 781.735.0418 | mcardlegannon.com

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING B-3 (MW)

PROJECT: Senior Housing Building - 1435-1449 Main Street, Weymouth, MA
CLIENT: Atlantic Development
CONTRACTOR: Technical Drilling Services

MGA NO. : W0821
SHEET NO. : 1 of 2
LOCATION N : See Plan
E :
ELEVATION :
DATE START : 08/24/2020
END : 08/24/2020
DRILLER : Gary Caouette
ENGINEER : Sherry Holmes

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HSA	Split Spoon	----
8/24/20	1:50pm	19	20	22	Size I.D.	4-1/4"	1-3/8"	----
8/26/20		19.2	MW		Hammer Wt.	----	140#	- - - -
					Hammer Fall	----	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS	Well Schematic
0			8	S-1	0.0	3	-0.5	Dark brown, fine to medium SAND, some Silt, trace Roots.	
			11	S-1A	0.5	8	0.5	-TOPSOIL-	
			21		0.5		-1.5	Dense, brown to orange-brown, fine to coarse SAND and fine to	
			28	S-1B	1.5	3	1.5	coarse GRAVEL, little Silt.	
					1.5			-FILL-	
					2.0			Gray-brown, fine to coarse GRAVEL, some fine to coarse Sand,	
4								trace (-) Silt.	
			28	S-2	5.0	5		Very dense, gray-brown, fine to coarse GRAVEL and fine to	
			100		6.0			coarse SAND, trace (-) Silt.	
								[Very difficult augering through numerous cobbles/boulders	
8								within the sand and gravel soils]	
			30	S-3	10.0	10		Very dense, gray-brown, fine to coarse SAND and some fine to	
			27		12.0			coarse GRAVEL, little (-) Silt.	
			23						
12			22					-SAND & GRAVEL-	
			16	S-4	15.0	9		Very dense, gray-brown, fine to coarse SAND and fine to coarse	
			33		17.0			GRAVEL, trace (-) Silt.	
16			64						
			37						
20			5	S-5	20.0	15		Medium dense, wet, gray-brown, fine to coarse SAND, some (-)	
			11		22.0			fine to coarse Gravel, trace (-) Silt.	
			8						
			30						

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

SUMMARY
Overburden:
Rock:
Samples:

BORING B-3 (MW)

300 Oak Street, Suite 460 Pembroke, MA 02359 | Telephone 781.826.0040 | Fax 781.735.0418 | mcardlegannon.com

McArdle Gannon Associates, Inc. Engineers & Consultants	TEST BORING LOG	BORING B-3 (MW)

PROJECT: Senior Housing Building - 1435-1449 Main Street, Weymouth, MA
CLIENT: Atlantic Development

MGA NO. : W0821
SHEET NO. : 2 of 2

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS	Well Schematic
							-23.0		
							23.0	AUGER REFUSAL AT 23 FEET	
24									
28									
32									
36									
40									
44									
48									

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION

- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

SUMMARY

Overburden:
Rock:
Samples:

BORING B-3 (MW)

300 Oak Street, Suite 460 Pembroke, MA 02359 | Telephone 781.826.0040 | Fax 781.735.0418 | mcardlegannon.com

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Asphalt
	Fill
	Sand & Gravel
	Topsoil
Soil Samplers	
	Split Spoon
Monitor Well Details	
	flush-mount cover
	protective casing set in concrete
	assorted cuttings
	bentonite pellets
	silica sand, blank PVC
	slotted pipe w/ sand

Notes:

1. Technical Drilling Services of Sterling, Massachusetts performed the test borings on August 24, 2020 using a truck mounted drill rig equipped with a 140-pound automatic trip hammer.

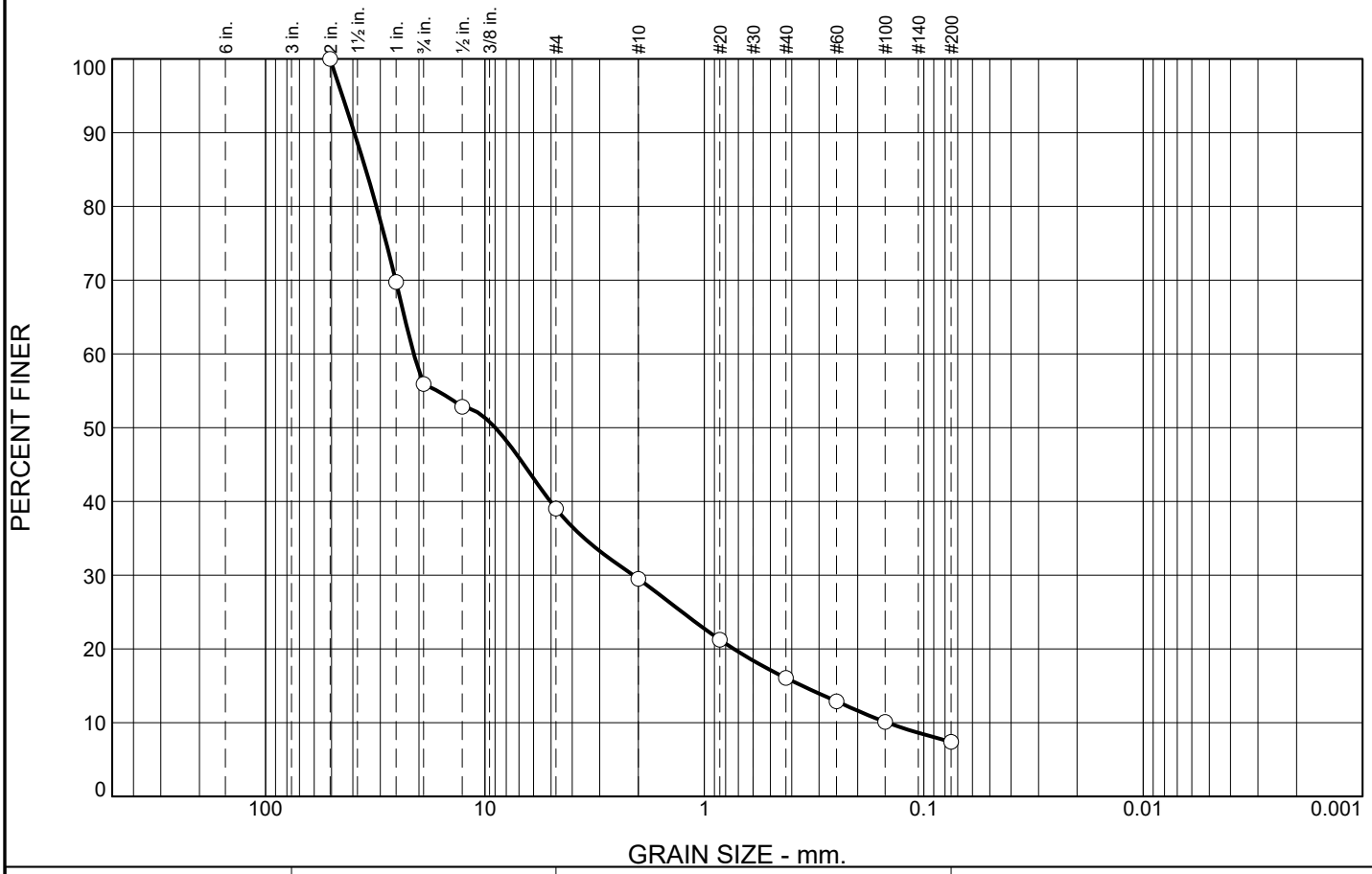
2. Test boring elevations were not available.

3. MGA and PES Associates (PES) observed and logged the test borings.

4. PES obtained groundwater readings in the monitoring wells on August 26, 2020.

APPENDIX C: GEOTECHNICAL LABORATORY TEST RESULTS

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	44.1	16.9	9.5	13.4	8.7	7.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1	69.8		
3/4	55.9		
1/2	52.8		
#4	39.0		
#10	29.5		
#20	21.2		
#40	16.1		
#60	12.9		
#100	10.1		
#200	7.4		

* (no specification provided)

Material Description

Gray-brown, fine to coarse GRAVEL, some fine to coarse Sand, trace Silt.

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 39.3990 D_{85}= 34.9535 D_{60}= 21.1043
D_{50}= 8.9676 D_{30}= 2.1098 D_{15}= 0.3578
D_{10}= 0.1465 C_u= 144.05 C_c= 1.44

Classification

USCS= AASHTO=

Remarks

Natural Sand & Gravel
Water Content: 1.1%

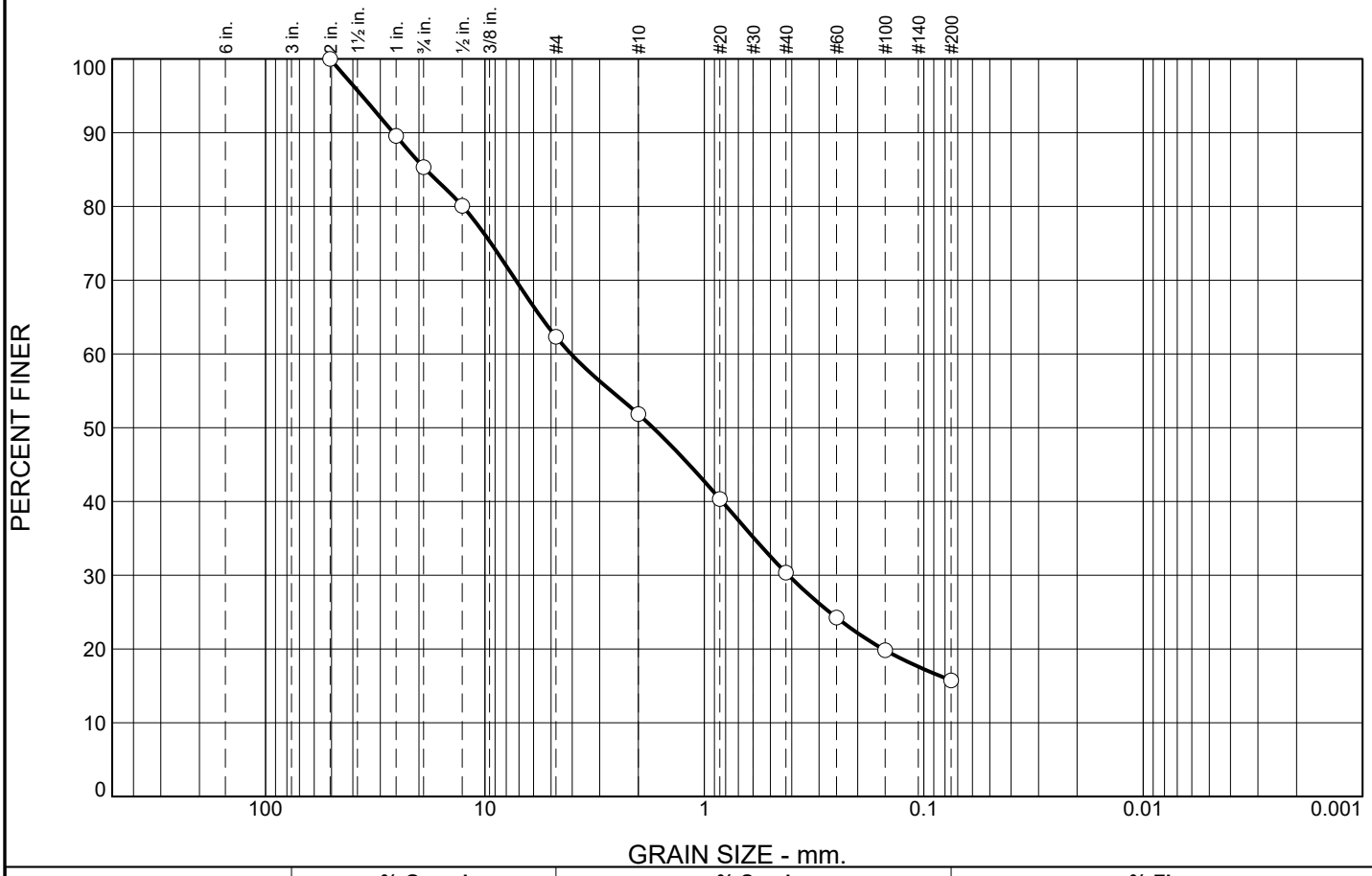
Source of Sample: B-1 **Depth:** 5-6.8'
Sample Number: S-3

Date: 08/25/2020

McArdle Gannon Associates, Inc.
Engineers & Consultants

Client: Atlantic Development
Project: Proposed Senior Housing Building
1435-1449 Main Street, Weymouth, Massachusetts
Project No: W0821 **Figure**

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.7	23.0	10.4	21.6	14.6	15.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1	89.6		
3/4	85.3		
1/2	80.1		
#4	62.3		
#10	51.9		
#20	40.3		
#40	30.3		
#60	24.3		
#100	19.8		
#200	15.7		

* (no specification provided)

Material Description

Brown to orange-brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt.

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 26.1182 D_{85}= 18.5889 D_{60}= 4.0516
D_{50}= 1.7128 D_{30}= 0.4138 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Existing Fill
Water Content: 5.8%

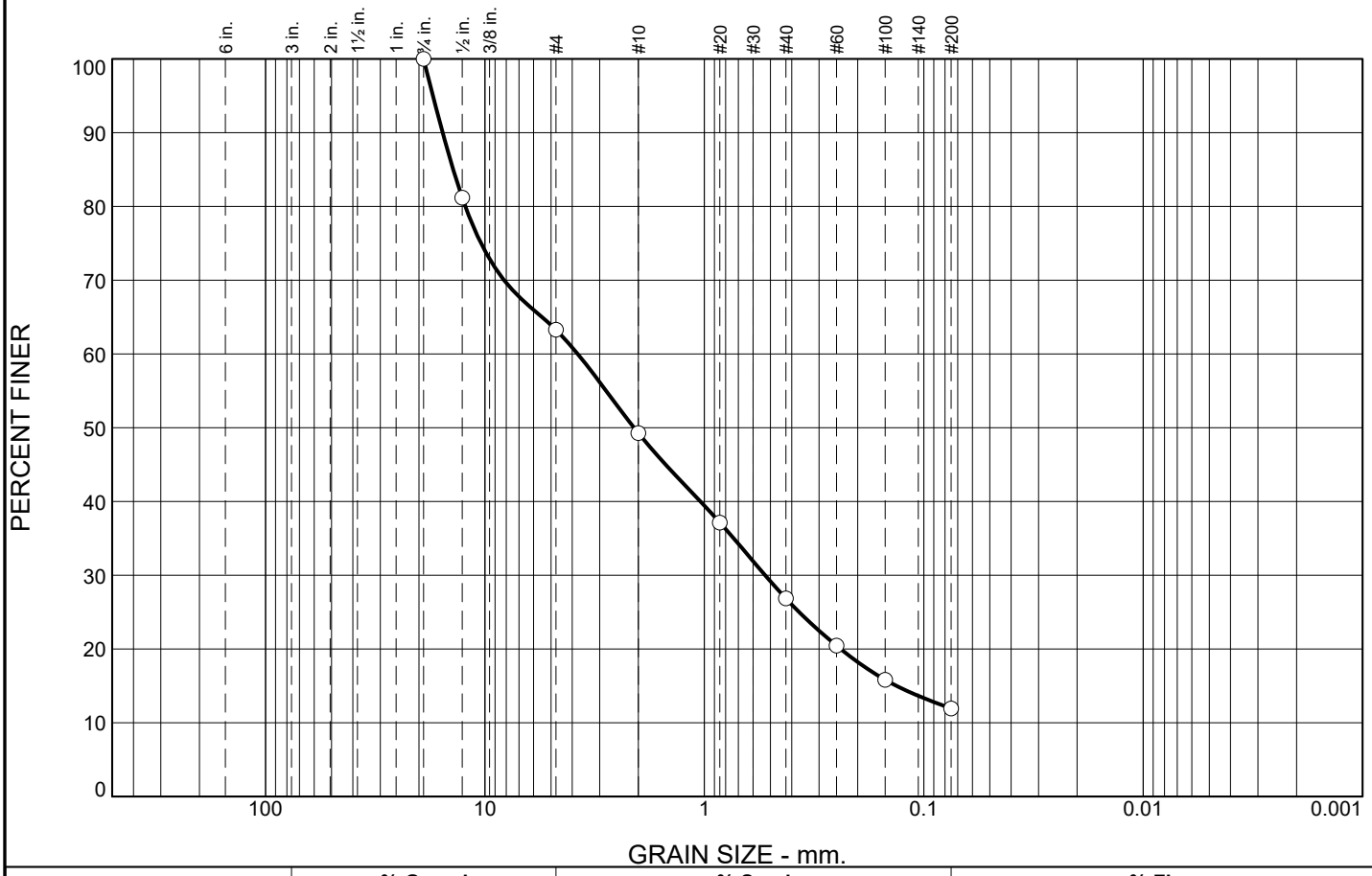
Source of Sample: B-3 **Depth:** 0.5-1.5'
Sample Number: S-1A

Date: 08/25/2020

McArdle Gannon Associates, Inc.
Engineers & Consultants

Client: Atlantic Development
Project: Proposed Senior Housing Building
1435-1449 Main Street, Weymouth, Massachusetts
Project No: W0821 **Figure**

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	36.7	14.0	22.4	15.0	11.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	81.2		
#4	63.3		
#10	49.3		
#20	37.1		
#40	26.9		
#60	20.5		
#100	15.8		
#200	11.9		

* (no specification provided)

Material Description

Gray-brown, fine to coarse SAND and some fine to coarse GRAVEL, little (-) Silt.

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 15.5846 D_{85}= 13.9608 D_{60}= 3.7778
D_{50}= 2.0904 D_{30}= 0.5284 D_{15}= 0.1332
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Natural Sand & Gravel
Water Content: 1.7%

Source of Sample: B-3 **Depth:** 10-12'
Sample Number: S-3

Date: 08/25/2020

McArdle Gannon Associates, Inc.
Engineers & Consultants

Client: Atlantic Development
Project: Proposed Senior Housing Building
1435-1449 Main Street, Weymouth, Massachusetts
Project No: W0821 **Figure**

APPENDIX D: EXISTING CONDITIONS HYDROLOGIC ANALYSIS

- *EXISTING CONDITIONS HYDROCAD COMPUTATIONS*

NOTE: TIME OF CONCENTRATION (TC)
SHALL BE 6 MINUTES

HSG A

E1

AREA=131,492 SF

DP1

MAIN STREET

(A.K.A. ROUTE 18)

(PUBLIC - VARIABLE WIDTH)

TWO WAY TRAFFIC

(ASPHALT ROADWAY)

GRASS AREA

EDGE OF WOODS

WOODED AREA

FRAME SHED

CONC. PAD (TYP.)

ASPHALT WALK

EOP

METAL SHED

ASPHALT PAVEMENT

LSA

CB

CONC CURB

1 STORY FRAME BUILDING BFFH=2,418 ± SF

MH

DMH RIM=174.04

ASPHALT WALK

GRANITE CURB INV=172.84

DMH RIM=173.09

CB INV=172.54

DMH RIM=169.85

MH RIM=168.92 (175.55) INV(E)=162.7 (166.43) INV(W)=162.7 (166.43)

CB INV=164.83

DMH RIM=165.36

MH RIM=164.83 (171.46)

BOHLER

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
FACILITY MANAGEMENT
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

811 Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	W201012
DRAWN BY:	CFD
CHECKED BY:	RMM
DATE:	12/17/2020
CAD I.D.:	W201012-CVL-0

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

ATLANTIC DEVELOPMENT

PROPOSED
SENIOR LIVING FACILITY

MAP #57, BLOCK #624,
LOTS #12, 13, 29, 30, 31 & 32
1427 - 1449 MAIN STREET
CITY OF WEYMOUTH
NORFOLK COUNTY, MA

BOHLER

352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900

www.BohlerEngineering.com

J.G. SWERLING

PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE No. 41692
NEW HAMPSHIRE LICENSE No. 14406
MAINE LICENSE No. 13816
CONNECTICUT LICENSE No. 28785
RHODE ISLAND LICENSE No. 11425

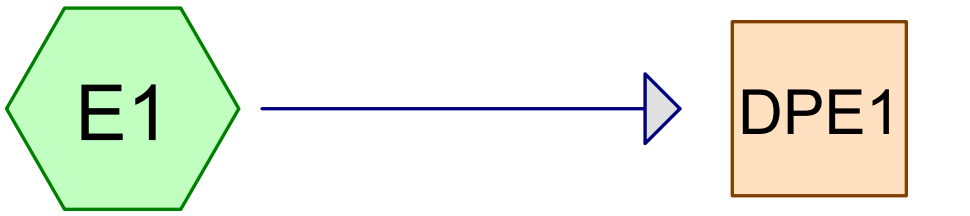
SHEET TITLE:

EXISTING CONDITIONS WATERSHED MAP

SHEET NUMBER:

WS-EX

ORG. DATE - 12/17/2020



to Main Street

Main Street

Subcat Reach Pond Link

Routing Diagram for W201012 Model
Prepared by Bohler, Printed 12/15/2020

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: to Main Street Runoff Area=131,492 sf 40.45% Impervious Runoff Depth>0.51"
Tc=6.0 min CN=61 Runoff=1.21 cfs 0.128 af

Reach DPE1: Main Street Inflow=1.21 cfs 0.128 af
Outflow=1.21 cfs 0.128 af

Total Runoff Area = 3.019 ac Runoff Volume = 0.128 af Average Runoff Depth = 0.51"
59.55% Pervious = 1.798 ac 40.45% Impervious = 1.221 ac

Summary for Subcatchment E1: to Main Street

Runoff = 1.21 cfs @ 12.12 hrs, Volume= 0.128 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.36"

Area (sf)	CN	Description
53,483	39	>75% Grass cover, Good, HSG A
41,114	98	Paved parking, HSG A
24,820	30	Woods, Good, HSG A
12,075	98	Roofs, HSG A
131,492	61	Weighted Average
78,303		59.55% Pervious Area
53,189		40.45% Impervious Area

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

Summary for Reach DPE1: Main Street

Inflow Area = 3.019 ac, 40.45% Impervious, Inflow Depth > 0.51" for 2 yr event
Inflow = 1.21 cfs @ 12.12 hrs, Volume= 0.128 af
Outflow = 1.21 cfs @ 12.12 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: to Main Street Runoff Area=131,492 sf 40.45% Impervious Runoff Depth>1.44"
Tc=6.0 min CN=61 Runoff=4.61 cfs 0.362 af

Reach DPE1: Main Street Inflow=4.61 cfs 0.362 af
Outflow=4.61 cfs 0.362 af

Total Runoff Area = 3.019 ac Runoff Volume = 0.362 af Average Runoff Depth = 1.44"
59.55% Pervious = 1.798 ac 40.45% Impervious = 1.221 ac

Summary for Subcatchment E1: to Main Street

Runoff = 4.61 cfs @ 12.10 hrs, Volume= 0.362 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=5.12"

Area (sf)	CN	Description
53,483	39	>75% Grass cover, Good, HSG A
41,114	98	Paved parking, HSG A
24,820	30	Woods, Good, HSG A
12,075	98	Roofs, HSG A
131,492	61	Weighted Average
78,303		59.55% Pervious Area
53,189		40.45% Impervious Area

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

Summary for Reach DPE1: Main Street

Inflow Area = 3.019 ac, 40.45% Impervious, Inflow Depth > 1.44" for 10 yr event
Inflow = 4.61 cfs @ 12.10 hrs, Volume= 0.362 af
Outflow = 4.61 cfs @ 12.10 hrs, Volume= 0.362 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: to Main Street Runoff Area=131,492 sf 40.45% Impervious Runoff Depth>2.15"
Tc=6.0 min CN=61 Runoff=7.20 cfs 0.541 af

Reach DPE1: Main Street Inflow=7.20 cfs 0.541 af
Outflow=7.20 cfs 0.541 af

Total Runoff Area = 3.019 ac Runoff Volume = 0.541 af Average Runoff Depth = 2.15"
59.55% Pervious = 1.798 ac 40.45% Impervious = 1.221 ac

Summary for Subcatchment E1: to Main Street

Runoff = 7.20 cfs @ 12.10 hrs, Volume= 0.541 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.22"

Area (sf)	CN	Description
53,483	39	>75% Grass cover, Good, HSG A
41,114	98	Paved parking, HSG A
24,820	30	Woods, Good, HSG A
12,075	98	Roofs, HSG A
131,492	61	Weighted Average
78,303		59.55% Pervious Area
53,189		40.45% Impervious Area

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

Summary for Reach DPE1: Main Street

Inflow Area = 3.019 ac, 40.45% Impervious, Inflow Depth > 2.15" for 25 yr event
Inflow = 7.20 cfs @ 12.10 hrs, Volume= 0.541 af
Outflow = 7.20 cfs @ 12.10 hrs, Volume= 0.541 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: to Main Street Runoff Area=131,492 sf 40.45% Impervious Runoff Depth>3.38"
Tc=6.0 min CN=61 Runoff=11.61 cfs 0.850 af

Reach DPE1: Main Street Inflow=11.61 cfs 0.850 af
Outflow=11.61 cfs 0.850 af

Total Runoff Area = 3.019 ac Runoff Volume = 0.850 af Average Runoff Depth = 3.38"
59.55% Pervious = 1.798 ac 40.45% Impervious = 1.221 ac

Summary for Subcatchment E1: to Main Street

Runoff = 11.61 cfs @ 12.10 hrs, Volume= 0.850 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.92"

Area (sf)	CN	Description
53,483	39	>75% Grass cover, Good, HSG A
41,114	98	Paved parking, HSG A
24,820	30	Woods, Good, HSG A
12,075	98	Roofs, HSG A
131,492	61	Weighted Average
78,303		59.55% Pervious Area
53,189		40.45% Impervious Area

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

Summary for Reach DPE1: Main Street

Inflow Area = 3.019 ac, 40.45% Impervious, Inflow Depth > 3.38" for 100 yr event
Inflow = 11.61 cfs @ 12.10 hrs, Volume= 0.850 af
Outflow = 11.61 cfs @ 12.10 hrs, Volume= 0.850 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

APPENDIX E: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*

NOTE: TIME OF CONCENTRATION (TC)
SHALL BE 6 MINUTES

P1
AREA=41,075 SF

P2
AREA=54,155 SF

P3
AREA=32,282 SF

P4
AREA=3,980 SF

DP1

GRASS AREA
EDGE OF WOODS
CONC PAD (TYP.)
FRAME SHED
ASPHALT WALK
EOP
METAL SHED
ASPHALT PAVEMENT
WOODED AREA
GENERATOR
CONTROL
TRASH
LSA
CONC CURB
1 STORY FRAME BUILDING BFFH=2.418 ± 5'
CONC WALK
DMH RIM=174.04
ASPHALT WALK
GRANITE CURB
GRT=173.84
DMH RIM=173.09
CB GRT=172.54
DMH RIM=169.85
CB GRT=164.83
DMH RIM=165.36
GRANITE CURB
ASPHALT WALK

MAIN STREET
(A.K.A. ROUTE 18)
(PUBLIC - VARIABLE WIDTH)
TWO WAY TRAFFIC
(ASPHALT ROADWAY)

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
FACILITY MASTER PLANNING
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	W201012
DRAWN BY:	CFD
CHECKED BY:	RMM
DATE:	12/17/2020
CAD I.D.:	W201012-CVL-0

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

ATLANTIC DEVELOPMENT

PROPOSED
SENIOR LIVING FACILITY

MAP #57, BLOCK #624,
LOTS #12, 13, 29, 30, 31 & 32
1427 - 1449 MAIN STREET
CITY OF WEYMOUTH
NORFOLK COUNTY, MA

BOHLER
352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
www.BohlerEngineering.com

J.G. SWERLING
PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE No. 41693
NEW HAMPSHIRE LICENSE No. 14808
MAINE LICENSE No. 13818
CONNECTICUT LICENSE No. 29785
RHODE ISLAND LICENSE No. 11425

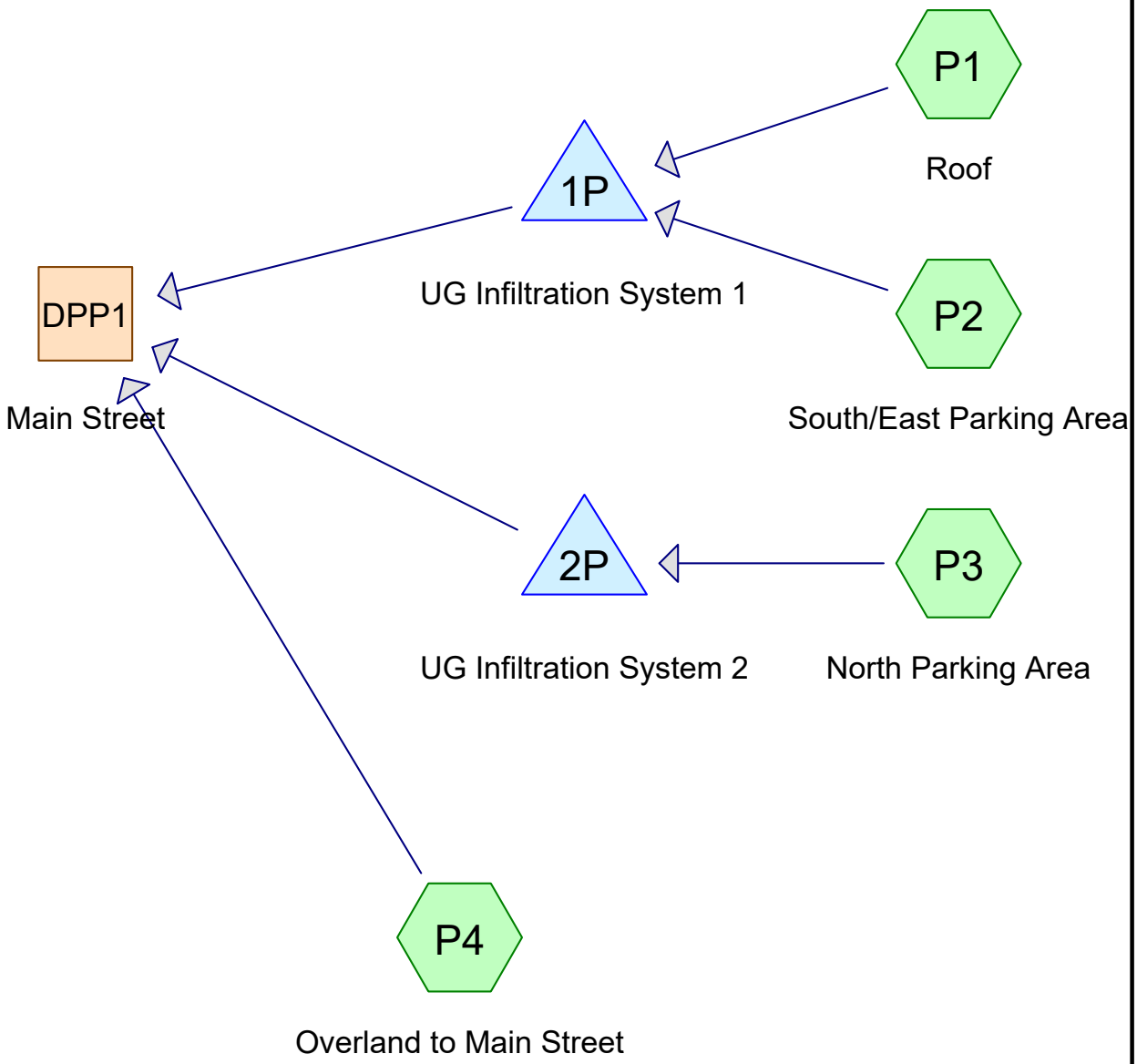
SHEET TITLE:

PROPOSED CONDITIONS WATERSHED MAP

SHEET NUMBER:

WS-PR

ORG. DATE - 12/17/2020



Subcat Reach Pond Link

Routing Diagram for W201012 Model
Prepared by Bohler, Printed 12/15/2020

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: Roof Runoff Area=41,075 sf 100.00% Impervious Runoff Depth>3.12"
Tc=6.0 min CN=98 Runoff=3.01 cfs 0.246 af

Subcatchment P2: South/East Parking Area Runoff Area=54,155 sf 60.52% Impervious Runoff Depth>1.20"
Tc=6.0 min CN=75 Runoff=1.66 cfs 0.125 af

Subcatchment P3: North Parking Area Runoff Area=32,282 sf 59.46% Impervious Runoff Depth>1.14"
Tc=6.0 min CN=74 Runoff=0.94 cfs 0.071 af

Subcatchment P4: Overland to Main Street Runoff Area=3,980 sf 15.83% Impervious Runoff Depth>0.12"
Tc=6.0 min CN=48 Runoff=0.00 cfs 0.001 af

Reach DPP1: Main Street Inflow=0.53 cfs 0.015 af
Outflow=0.53 cfs 0.015 af

Pond 1P: UG Infiltration System 1 Peak Elev=167.17' Storage=4,645 cf Inflow=4.66 cfs 0.370 af
Discarded=0.69 cfs 0.370 af Primary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.370 af

Pond 2P: UG Infiltration System 2 Peak Elev=161.62' Storage=916 cf Inflow=0.94 cfs 0.071 af
Discarded=0.05 cfs 0.057 af Primary=0.53 cfs 0.014 af Outflow=0.58 cfs 0.070 af

Total Runoff Area = 3.019 ac Runoff Volume = 0.442 af Average Runoff Depth = 1.76"
28.76% Pervious = 0.868 ac 71.24% Impervious = 2.150 ac

Summary for Subcatchment P1: Roof

Runoff = 3.01 cfs @ 12.09 hrs, Volume= 0.246 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.36"

Area (sf)	CN	Description
41,075	98	Unconnected roofs, HSG A
41,075		100.00% Impervious Area
41,075		100.00% Unconnected

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

Summary for Subcatchment P2: South/East Parking Area

Runoff = 1.66 cfs @ 12.10 hrs, Volume= 0.125 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.36"

Area (sf)	CN	Description
21,100	39	>75% Grass cover, Good, HSG A
32,775	98	Paved parking, HSG A
280	30	Woods, Good, HSG A
54,155	75	Weighted Average
21,380		39.48% Pervious Area
32,775		60.52% Impervious Area

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

Summary for Subcatchment P3: North Parking Area

Runoff = 0.94 cfs @ 12.10 hrs, Volume= 0.071 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.36"

Area (sf)	CN	Description
19,195	98	Paved parking, HSG A
11,607	39	>75% Grass cover, Good, HSG A
1,480	30	Woods, Good, HSG A
32,282	74	Weighted Average
13,087		40.54% Pervious Area
19,195		59.46% Impervious Area

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

Summary for Subcatchment P4: Overland to Main Street

Runoff = 0.00 cfs @ 13.63 hrs, Volume= 0.001 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.36"

Area (sf)	CN	Description
630	98	Paved parking, HSG A
3,350	39	>75% Grass cover, Good, HSG A
3,980	48	Weighted Average
3,350		84.17% Pervious Area
630		15.83% Impervious Area

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

Summary for Reach DPP1: Main Street

Inflow Area = 3.019 ac, 71.24% Impervious, Inflow Depth > 0.06" for 2 yr event
Inflow = 0.53 cfs @ 12.36 hrs, Volume= 0.015 af
Outflow = 0.53 cfs @ 12.36 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: UG Infiltration System 1

Inflow Area = 2.186 ac, 77.55% Impervious, Inflow Depth > 2.03" for 2 yr event
Inflow = 4.66 cfs @ 12.09 hrs, Volume= 0.370 af
Outflow = 0.69 cfs @ 11.70 hrs, Volume= 0.370 af, Atten= 85%, Lag= 0.0 min
Discarded = 0.69 cfs @ 11.70 hrs, Volume= 0.370 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 167.17' @ 12.62 hrs Surf.Area= 3,595 sf Storage= 4,645 cf

Plug-Flow detention time= 43.6 min calculated for 0.369 af (100% of inflow)
Center-of-Mass det. time= 43.2 min (831.9 - 788.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	165.25'	5,845 cf	**37.58'W x 95.67'L x 6.75'H Field A** 24,269 cf Overall - 9,657 cf Embedded = 14,613 cf x 40.0% Voids
#2A	166.00'	9,657 cf	**ADS_StormTech MC-4500 +Cap** x 88 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 22 Chambers

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

15,502 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	173.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.69 cfs @ 11.70 hrs HW=165.33' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.25' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 2P: UG Infiltration System 2

Inflow Area = 0.741 ac, 59.46% Impervious, Inflow Depth > 1.14" for 2 yr event
Inflow = 0.94 cfs @ 12.10 hrs, Volume= 0.071 af
Outflow = 0.58 cfs @ 12.36 hrs, Volume= 0.070 af, Atten= 38%, Lag= 15.5 min
Discarded = 0.05 cfs @ 11.65 hrs, Volume= 0.057 af
Primary = 0.53 cfs @ 12.36 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 161.62' @ 12.36 hrs Surf.Area= 281 sf Storage= 916 cf

Plug-Flow detention time= 148.6 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 146.2 min (1,004.5 - 858.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	156.60'	519 cf	**10.33'W x 27.24'L x 6.75'H Field A** 1,900 cf Overall - 604 cf Embedded = 1,296 cf x 40.0% Voids
#2A	157.35'	604 cf	**ADS_StormTech MC-4500 +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

1,122 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	161.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 11.65 hrs HW=156.68' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.46 cfs @ 12.36 hrs HW=161.60' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.46 cfs @ 0.90 fps)

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: Roof Runoff Area=41,075 sf 100.00% Impervious Runoff Depth>4.88"
Tc=6.0 min CN=98 Runoff=4.61 cfs 0.383 af

Subcatchment P2: South/East Parking Area Runoff Area=54,155 sf 60.52% Impervious Runoff Depth>2.54"
Tc=6.0 min CN=75 Runoff=3.63 cfs 0.264 af

Subcatchment P3: North Parking Area Runoff Area=32,282 sf 59.46% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=74 Runoff=2.09 cfs 0.152 af

Subcatchment P4: Overland to Main Street Runoff Area=3,980 sf 15.83% Impervious Runoff Depth>0.63"
Tc=6.0 min CN=48 Runoff=0.04 cfs 0.005 af

Reach DPP1: Main Street Inflow=2.26 cfs 0.082 af
Outflow=2.26 cfs 0.082 af

Pond 1P: UG Infiltration System 1 Peak Elev=169.28' Storage=10,520 cf Inflow=8.24 cfs 0.647 af
Discarded=0.69 cfs 0.647 af Primary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.647 af

Pond 2P: UG Infiltration System 2 Peak Elev=161.79' Storage=941 cf Inflow=2.09 cfs 0.152 af
Discarded=0.05 cfs 0.062 af Primary=2.23 cfs 0.078 af Outflow=2.28 cfs 0.140 af

Total Runoff Area = 3.019 ac Runoff Volume = 0.804 af Average Runoff Depth = 3.19"
28.76% Pervious = 0.868 ac 71.24% Impervious = 2.150 ac

Summary for Subcatchment P1: Roof

Runoff = 4.61 cfs @ 12.09 hrs, Volume= 0.383 af, Depth> 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=5.12"

Area (sf)	CN	Description
41,075	98	Unconnected roofs, HSG A
41,075		100.00% Impervious Area
41,075		100.00% Unconnected

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

Summary for Subcatchment P2: South/East Parking Area

Runoff = 3.63 cfs @ 12.09 hrs, Volume= 0.264 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=5.12"

Area (sf)	CN	Description
21,100	39	>75% Grass cover, Good, HSG A
32,775	98	Paved parking, HSG A
280	30	Woods, Good, HSG A
54,155	75	Weighted Average
21,380		39.48% Pervious Area
32,775		60.52% Impervious Area

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

Summary for Subcatchment P3: North Parking Area

Runoff = 2.09 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=5.12"

Area (sf)	CN	Description
19,195	98	Paved parking, HSG A
11,607	39	>75% Grass cover, Good, HSG A
1,480	30	Woods, Good, HSG A
32,282	74	Weighted Average
13,087		40.54% Pervious Area
19,195		59.46% Impervious Area

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

Summary for Subcatchment P4: Overland to Main Street

Runoff = 0.04 cfs @ 12.15 hrs, Volume= 0.005 af, Depth> 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=5.12"

Area (sf)	CN	Description
630	98	Paved parking, HSG A
3,350	39	>75% Grass cover, Good, HSG A
3,980	48	Weighted Average
3,350		84.17% Pervious Area
630		15.83% Impervious Area

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

Summary for Reach DPP1: Main Street

Inflow Area = 3.019 ac, 71.24% Impervious, Inflow Depth > 0.33" for 10 yr event
Inflow = 2.26 cfs @ 12.10 hrs, Volume= 0.082 af
Outflow = 2.26 cfs @ 12.10 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: UG Infiltration System 1

Inflow Area = 2.186 ac, 77.55% Impervious, Inflow Depth > 3.55" for 10 yr event
Inflow = 8.24 cfs @ 12.09 hrs, Volume= 0.647 af
Outflow = 0.69 cfs @ 11.45 hrs, Volume= 0.647 af, Atten= 92%, Lag= 0.0 min
Discarded = 0.69 cfs @ 11.45 hrs, Volume= 0.647 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 169.28' @ 13.16 hrs Surf.Area= 3,595 sf Storage= 10,520 cf

Plug-Flow detention time= 120.4 min calculated for 0.647 af (100% of inflow)
Center-of-Mass det. time= 120.1 min (902.3 - 782.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	165.25'	5,845 cf	**37.58'W x 95.67'L x 6.75'H Field A** 24,269 cf Overall - 9,657 cf Embedded = 14,613 cf x 40.0% Voids
#2A	166.00'	9,657 cf	**ADS_StormTech MC-4500 +Cap** x 88 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 22 Chambers

		Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
	15,502 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	173.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.69 cfs @ 11.45 hrs HW=165.34' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.25' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 2P: UG Infiltration System 2

Inflow Area = 0.741 ac, 59.46% Impervious, Inflow Depth > 2.46" for 10 yr event
Inflow = 2.09 cfs @ 12.09 hrs, Volume= 0.152 af
Outflow = 2.28 cfs @ 12.10 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.4 min
Discarded = 0.05 cfs @ 10.80 hrs, Volume= 0.062 af
Primary = 2.23 cfs @ 12.10 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 161.79' @ 12.10 hrs Surf.Area= 281 sf Storage= 941 cf

Plug-Flow detention time= 87.3 min calculated for 0.139 af (92% of inflow)
Center-of-Mass det. time= 47.5 min (883.2 - 835.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	156.60'	519 cf	**10.33'W x 27.24'L x 6.75'H Field A** 1,900 cf Overall - 604 cf Embedded = 1,296 cf x 40.0% Voids
#2A	157.35'	604 cf	**ADS_StormTech MC-4500 +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,122 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	161.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 10.80 hrs HW=156.67' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=2.21 cfs @ 12.10 hrs HW=161.79' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 2.21 cfs @ 1.53 fps)

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: Roof Runoff Area=41,075 sf 100.00% Impervious Runoff Depth>5.98"
Tc=6.0 min CN=98 Runoff=5.61 cfs 0.470 af

Subcatchment P2: South/East Parking Area Runoff Area=54,155 sf 60.52% Impervious Runoff Depth>3.47"
Tc=6.0 min CN=75 Runoff=4.96 cfs 0.359 af

Subcatchment P3: North Parking Area Runoff Area=32,282 sf 59.46% Impervious Runoff Depth>3.37"
Tc=6.0 min CN=74 Runoff=2.87 cfs 0.208 af

Subcatchment P4: Overland to Main Street Runoff Area=3,980 sf 15.83% Impervious Runoff Depth>1.10"
Tc=6.0 min CN=48 Runoff=0.09 cfs 0.008 af

Reach DPP1: Main Street Inflow=2.93 cfs 0.134 af
Outflow=2.93 cfs 0.134 af

Pond 1P: UG Infiltration System 1 Peak Elev=171.65' Storage=14,992 cf Inflow=10.57 cfs 0.829 af
Discarded=0.69 cfs 0.829 af Primary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.829 af

Pond 2P: UG Infiltration System 2 Peak Elev=161.84' Storage=948 cf Inflow=2.87 cfs 0.208 af
Discarded=0.05 cfs 0.065 af Primary=2.86 cfs 0.126 af Outflow=2.91 cfs 0.191 af

Total Runoff Area = 3.019 ac Runoff Volume = 1.045 af Average Runoff Depth = 4.16"
28.76% Pervious = 0.868 ac 71.24% Impervious = 2.150 ac

Summary for Subcatchment P1: Roof

Runoff = 5.61 cfs @ 12.09 hrs, Volume= 0.470 af, Depth> 5.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.22"

Area (sf)	CN	Description
41,075	98	Unconnected roofs, HSG A
41,075		100.00% Impervious Area
41,075		100.00% Unconnected

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

Summary for Subcatchment P2: South/East Parking Area

Runoff = 4.96 cfs @ 12.09 hrs, Volume= 0.359 af, Depth> 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.22"

Area (sf)	CN	Description
21,100	39	>75% Grass cover, Good, HSG A
32,775	98	Paved parking, HSG A
280	30	Woods, Good, HSG A
54,155	75	Weighted Average
21,380		39.48% Pervious Area
32,775		60.52% Impervious Area

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

Summary for Subcatchment P3: North Parking Area

Runoff = 2.87 cfs @ 12.09 hrs, Volume= 0.208 af, Depth> 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.22"

Area (sf)	CN	Description
19,195	98	Paved parking, HSG A
11,607	39	>75% Grass cover, Good, HSG A
1,480	30	Woods, Good, HSG A
32,282	74	Weighted Average
13,087		40.54% Pervious Area
19,195		59.46% Impervious Area

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

Summary for Subcatchment P4: Overland to Main Street

Runoff = 0.09 cfs @ 12.11 hrs, Volume= 0.008 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.22"

Area (sf)	CN	Description
630	98	Paved parking, HSG A
3,350	39	>75% Grass cover, Good, HSG A
3,980	48	Weighted Average
3,350		84.17% Pervious Area
630		15.83% Impervious Area

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

Summary for Reach DPP1: Main Street

Inflow Area = 3.019 ac, 71.24% Impervious, Inflow Depth > 0.53" for 25 yr event
Inflow = 2.93 cfs @ 12.07 hrs, Volume= 0.134 af
Outflow = 2.93 cfs @ 12.07 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: UG Infiltration System 1

Inflow Area = 2.186 ac, 77.55% Impervious, Inflow Depth > 4.55" for 25 yr event
Inflow = 10.57 cfs @ 12.09 hrs, Volume= 0.829 af
Outflow = 0.69 cfs @ 11.20 hrs, Volume= 0.829 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.69 cfs @ 11.20 hrs, Volume= 0.829 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 171.65' @ 13.78 hrs Surf.Area= 3,595 sf Storage= 14,992 cf

Plug-Flow detention time= 182.6 min calculated for 0.829 af (100% of inflow)
Center-of-Mass det. time= 182.2 min (961.1 - 778.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	165.25'	5,845 cf	**37.58'W x 95.67'L x 6.75'H Field A** 24,269 cf Overall - 9,657 cf Embedded = 14,613 cf x 40.0% Voids
#2A	166.00'	9,657 cf	**ADS_StormTech MC-4500 +Cap** x 88 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 22 Chambers

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

15,502 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	173.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.69 cfs @ 11.20 hrs HW=165.33' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.25' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 2P: UG Infiltration System 2

Inflow Area = 0.741 ac, 59.46% Impervious, Inflow Depth > 3.37" for 25 yr event
Inflow = 2.87 cfs @ 12.09 hrs, Volume= 0.208 af
Outflow = 2.91 cfs @ 12.07 hrs, Volume= 0.191 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.05 cfs @ 10.20 hrs, Volume= 0.065 af
Primary = 2.86 cfs @ 12.07 hrs, Volume= 0.126 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 161.84' @ 12.07 hrs Surf.Area= 281 sf Storage= 948 cf

Plug-Flow detention time= 65.6 min calculated for 0.191 af (92% of inflow)
Center-of-Mass det. time= 25.3 min (851.9 - 826.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	156.60'	519 cf	**10.33'W x 27.24'L x 6.75'H Field A** 1,900 cf Overall - 604 cf Embedded = 1,296 cf x 40.0% Voids
#2A	157.35'	604 cf	**ADS_StormTech MC-4500 +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

1,122 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	161.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 10.20 hrs HW=156.67' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=2.66 cfs @ 12.07 hrs HW=161.82' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 2.66 cfs @ 1.64 fps)

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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: Roof Runoff Area=41,075 sf 100.00% Impervious Runoff Depth>7.68"
Tc=6.0 min CN=98 Runoff=7.16 cfs 0.603 af

Subcatchment P2: South/East Parking Area Runoff Area=54,155 sf 60.52% Impervious Runoff Depth>4.97"
Tc=6.0 min CN=75 Runoff=7.07 cfs 0.514 af

Subcatchment P3: North Parking Area Runoff Area=32,282 sf 59.46% Impervious Runoff Depth>4.85"
Tc=6.0 min CN=74 Runoff=4.12 cfs 0.300 af

Subcatchment P4: Overland to Main Street Runoff Area=3,980 sf 15.83% Impervious Runoff Depth>1.99"
Tc=6.0 min CN=48 Runoff=0.19 cfs 0.015 af

Reach DPP1: Main Street Inflow=10.08 cfs 0.396 af
Outflow=10.08 cfs 0.396 af

Pond 1P: UG Infiltration System 1 Peak Elev=173.96' Storage=15,502 cf Inflow=14.22 cfs 1.118 af
Discarded=0.69 cfs 0.905 af Primary=8.18 cfs 0.171 af Outflow=8.87 cfs 1.075 af

Pond 2P: UG Infiltration System 2 Peak Elev=161.93' Storage=959 cf Inflow=4.12 cfs 0.300 af
Discarded=0.05 cfs 0.069 af Primary=4.09 cfs 0.210 af Outflow=4.15 cfs 0.279 af

Total Runoff Area = 3.019 ac Runoff Volume = 1.432 af Average Runoff Depth = 5.69"
28.76% Pervious = 0.868 ac 71.24% Impervious = 2.150 ac

Summary for Subcatchment P1: Roof

Runoff = 7.16 cfs @ 12.09 hrs, Volume= 0.603 af, Depth> 7.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.92"

Area (sf)	CN	Description
41,075	98	Unconnected roofs, HSG A
41,075		100.00% Impervious Area
41,075		100.00% Unconnected

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

Summary for Subcatchment P2: South/East Parking Area

Runoff = 7.07 cfs @ 12.09 hrs, Volume= 0.514 af, Depth> 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.92"

Area (sf)	CN	Description
21,100	39	>75% Grass cover, Good, HSG A
32,775	98	Paved parking, HSG A
280	30	Woods, Good, HSG A
54,155	75	Weighted Average
21,380		39.48% Pervious Area
32,775		60.52% Impervious Area

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

Summary for Subcatchment P3: North Parking Area

Runoff = 4.12 cfs @ 12.09 hrs, Volume= 0.300 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.92"

Area (sf)	CN	Description
19,195	98	Paved parking, HSG A
11,607	39	>75% Grass cover, Good, HSG A
1,480	30	Woods, Good, HSG A
32,282	74	Weighted Average
13,087		40.54% Pervious Area
19,195		59.46% Impervious Area

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

Summary for Subcatchment P4: Overland to Main Street

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.015 af, Depth> 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.92"

Area (sf)	CN	Description
630	98	Paved parking, HSG A
3,350	39	>75% Grass cover, Good, HSG A
3,980	48	Weighted Average
3,350		84.17% Pervious Area
630		15.83% Impervious Area

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

Summary for Reach DPP1: Main Street

Inflow Area = 3.019 ac, 71.24% Impervious, Inflow Depth > 1.57" for 100 yr event
Inflow = 10.08 cfs @ 12.30 hrs, Volume= 0.396 af
Outflow = 10.08 cfs @ 12.30 hrs, Volume= 0.396 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: UG Infiltration System 1

Inflow Area = 2.186 ac, 77.55% Impervious, Inflow Depth > 6.13" for 100 yr event
Inflow = 14.22 cfs @ 12.09 hrs, Volume= 1.118 af
Outflow = 8.87 cfs @ 12.30 hrs, Volume= 1.075 af, Atten= 38%, Lag= 12.5 min
Discarded = 0.69 cfs @ 10.60 hrs, Volume= 0.905 af
Primary = 8.18 cfs @ 12.30 hrs, Volume= 0.171 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 173.96' @ 12.30 hrs Surf.Area= 3,595 sf Storage= 15,502 cf

Plug-Flow detention time= 168.9 min calculated for 1.075 af (96% of inflow)
Center-of-Mass det. time= 146.4 min (920.9 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	165.25'	5,845 cf	**37.58'W x 95.67'L x 6.75'H Field A** 24,269 cf Overall - 9,657 cf Embedded = 14,613 cf x 40.0% Voids
#2A	166.00'	9,657 cf	**ADS_StormTech MC-4500 +Cap** x 88 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 22 Chambers

Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

15,502 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	173.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.69 cfs @ 10.60 hrs HW=165.33' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=7.73 cfs @ 12.30 hrs HW=173.94' (Free Discharge)
2=Orifice/Grate (Weir Controls 7.73 cfs @ 2.18 fps)

Summary for Pond 2P: UG Infiltration System 2

Inflow Area = 0.741 ac, 59.46% Impervious, Inflow Depth > 4.85" for 100 yr event
Inflow = 4.12 cfs @ 12.09 hrs, Volume= 0.300 af
Outflow = 4.15 cfs @ 12.09 hrs, Volume= 0.279 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.05 cfs @ 9.30 hrs, Volume= 0.069 af
Primary = 4.09 cfs @ 12.09 hrs, Volume= 0.210 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 161.93' @ 12.09 hrs Surf.Area= 281 sf Storage= 959 cf

Plug-Flow detention time= 48.2 min calculated for 0.279 af (93% of inflow)
Center-of-Mass det. time= 13.0 min (829.1 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	156.60'	519 cf	**10.33'W x 27.24'L x 6.75'H Field A** 1,900 cf Overall - 604 cf Embedded = 1,296 cf x 40.0% Voids
#2A	157.35'	604 cf	**ADS_StormTech MC-4500 +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

1,122 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	161.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 9.30 hrs HW=156.67' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=4.02 cfs @ 12.09 hrs HW=161.92' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 4.02 cfs @ 1.91 fps)

APPENDIX F: STORMWATER CALCULATIONS

- *MA STANDARD #3 – RECHAGRE AND DRAWDOWN TIME*
- *MA STANDARD #4 – WATER QUALITY AND TSS REMOVAL*
- *NOAA RAINFALL DATA*
- *PIPE SIZING*

Atlantic Development - Weymouth, MA
1435 Main Street
Weymouth, MA
Bohler Job Number: W201012
December 17, 2020

MA DEP Standard 3: Recharge Volume Calculations

Required Recharge Volume - A Soils (0.60 in.)	
Existing Site Impervious Area (ac)	0.984
Proposed Site Impervious Area (ac)	1.888
Proposed Increase in Site Impervious Area (ac)	0.904
Recharge Volume Required (cf)	**1,969**

Required Recharge Volume - B Soils (0.35 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	**0**

Required Recharge Volume - C Soils (0.25 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	**0**

Required Recharge Volume - D Soils (0.10 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	**0**

Total Recharge Volume Required (cf)	**1,969**

Recharge Volume Adjustment Factor	
Impervious Area Directed to Infiltration BMP (ac)	**0.000**
%Impervious Directed to Infiltration BMP	
Adjustment Factor	
Adjusted Total Recharge Volume Required (cf)	

Provided Recharge Volume*	
Underground Infiltration System - 1	15,430
Underground Infiltration System - 2	898
Total Recharge Volume Provided (cf)	**16,328**

Input Required

*Volume provided below lowest outlet in cubic feet (cf)

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

Atlantic Development - Weymouth, MA
1435 Main Street
Weymouth, MA
Bohler Job Number: W201012
December 17, 2020

MA DEP Standard 3: Drawdown Time Calculations

Drawdown Time - Underground Infiltration System - 1	
Volume below outlet pipe (Rv) (cf)	15,430
Soil Type	Sand - A
Infiltration rate (K)*	8.27
Bottom Area (sf)	3,595
Drawdown time (Hours)*	6.2

Drawdown Time - Underground Infiltration System - 2	
Volume below outlet pipe (Rv) (cf)	898
Soil Type	Sand - A
Infiltration rate (K)*	8.27
Bottom Area (sf)	281
Drawdown time (Hours)**	4.6

*Infiltration Rates taken from Rawls Table
**Drawdown time = Rv / (K) x (bottom area)

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

Atlantic Development - Weymouth, MA
1435 Main Street
Weymouth, MA
Bohler Job Number: W201012
December 17, 2020

MA DEP Standard 4: Water Quality Volume Calculations

Water Quality Volume Required	
Water Quality Volume runoff (in.)*	0.5
Total Post Development Impervious Area (sf)	82,241
Required Water Quality Volume (cf)	3,427

*Water Quality volume runoff is equal to 0.5 or 1.0 inches of runoff times the total impervious area of the post development project site.

Water Quality Volume Provided*	
Underground Infiltration System - 1	15,430
Underground Infiltration System - 2	898
Total Provided Water Quality Volume (cf)	16,328

*Volume provided below lowest outlet pipe in cubic feet (cf)

Provided greater than or Equal to Required

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

Stage-Area-Storage for Pond 1P: UG Infiltration System 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
165.25	**3,595**	0
165.35	3,595	144
165.45	3,595	288
165.55	3,595	431
165.65	3,595	575
165.75	3,595	719
165.85	3,595	863
165.95	3,595	1,007
166.05	3,595	1,233
166.15	3,595	1,541
166.25	3,595	1,849
166.35	3,595	2,156
166.45	3,595	2,462
166.55	3,595	2,767
166.65	3,595	3,072
166.75	3,595	3,375
166.85	3,595	3,677
166.95	3,595	3,979
167.05	3,595	4,279
167.15	3,595	4,579
167.25	3,595	4,876
167.35	3,595	5,173
167.45	3,595	5,468
167.55	3,595	5,762
167.65	3,595	6,055
167.75	3,595	6,346
167.85	3,595	6,635
167.95	3,595	6,922
168.05	3,595	7,207
168.15	3,595	7,491
168.25	3,595	7,773
168.35	3,595	8,052
168.45	3,595	8,329
168.55	3,595	8,604
168.65	3,595	8,877
168.75	3,595	9,147
168.85	3,595	9,415
168.95	3,595	9,680
169.05	3,595	9,942
169.15	3,595	10,200
169.25	3,595	10,456
169.35	3,595	10,709
169.45	3,595	10,957
169.55	3,595	11,202
169.65	3,595	11,443
169.75	3,595	11,680
169.85	3,595	11,912
169.95	3,595	12,140
170.05	3,595	12,362
170.15	3,595	12,578
170.25	3,595	12,787
170.35	3,595	12,990
170.45	3,595	13,183
170.55	3,595	13,363
170.65	3,595	13,529
170.75	3,595	13,687
170.85	3,595	13,841
170.95	3,595	13,991
171.05	3,595	14,136
171.15	3,595	14,279
171.25	3,595	14,423
171.35	3,595	14,567
171.45	3,595	14,711
171.55	3,595	14,855
171.65	3,595	14,998
171.75	3,595	15,142
171.85	3,595	15,286
171.95	3,595	**15,430**

@ Elevation = 171.95
15,430 CF of storage/water quality volume provided

Stage-Area-Storage for Pond 2P: UG Infiltration System 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
156.60	**281**	0
156.70	281	11
156.80	281	23
156.90	281	34
157.00	281	45
157.10	281	56
157.20	281	68
157.30	281	79
157.40	281	95
157.50	281	117
157.60	281	138
157.70	281	160
157.80	281	181
157.90	281	203
158.00	281	224
158.10	281	245
158.20	281	266
158.30	281	287
158.40	281	308
158.50	281	329
158.60	281	350
158.70	281	371
158.80	281	392
158.90	281	412
159.00	281	433
159.10	281	453
159.20	281	474
159.30	281	494
159.40	281	514
159.50	281	534
159.60	281	554
159.70	281	574
159.80	281	593
159.90	281	613
160.00	281	632
160.10	281	651
160.20	281	670
160.30	281	689
160.40	281	708
160.50	281	726
160.60	281	745
160.70	281	763
160.80	281	780
160.90	281	798
161.00	281	815
161.10	281	832
161.20	281	849
161.30	281	866
161.40	281	882
161.50	281	898
161.60	281	913
161.70	281	928
161.80	281	942
161.90	281	956
162.00	281	968
162.10	281	981
162.20	281	992
162.30	281	1,004
162.40	281	1,015
162.50	281	1,027
162.60	281	1,038
162.70	281	1,049
162.80	281	1,060
162.90	281	1,072
163.00	281	1,083
163.10	281	1,094
163.20	281	1,105
163.30	281	**1,117**

@ Weir Elevation = 161.50
898 CF of storage/water quality volume provided

TSS Removal Calculation Worksheet

Location: to Underground Infiltration System - 1

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
CB (Deep Sump)	**0.25**	**1.00**	**0.25**	**0.75**
Isolator Row	**0.80**	**0.75**	**0.60**	**0.15**
Underground Infiltration System	**0.80**	**0.15**	**0.12**	**0.03**

Total TSS Removal = **97%**

Project: **Senior Living Facility**

Prepared By: **Bohler**

Date: **12/17/2020**

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

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

TSS Removal Calculation Worksheet

Location: to Underground Infiltration System - 2

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
CB (Deep Sump)	**0.25**	**1.00**	**0.25**	**0.75**
Water Quality Unit	**0.80**	**0.75**	**0.60**	**0.15**
Underground Infiltration System	**0.80**	**0.15**	**0.12**	**0.03**

Total TSS Removal = **97%**

Project: **Senior Living Facility**

Prepared By: **Bohler**

Date: **12/17/2020**

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

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

Bohler Job # W201012
Calc: NPD
Date: 12/17/2020

1" Water Quality Volume to Flow Rate Calculation Sheet

This spreadsheet should be used to convert water quality volume to an equivalent water quality peak flow rate as outlined in the new MA DEP guidelines that take effect on October 15, 2013.

Glossary

Water Quality Flow Rate = WQF
Water Quality Volume = WQV*
Unit peak discharge (csm/in) = qu**
Impervious Area in watershed (square miles) = Ai

*WQV is expressed in watershed inches (you must use 1.0-inches in all cases with this method and not 0.5-inches)
** calculate the qu based on the time of concentration (see 1" - qu Table)

Compute Water Quality Flow with the following Equation

WQF = (qu)(A)(WQV)

Input Information (in colored cells only)

Site Plan Callout		Enter qu (from 1" - qu Table)	Enter Impervious Area (SF)	Ai (sq/mi)	WQV (inches)		WQF (cfs)	
DMH-4 (WQU)	=	774	19195	0.000689	1	=	**0.53**	CDS 2015 4

1" qu Sheet

	Tc (hours)	qu (csm/in)
	0.01	835
	0.03	835
	0.05	831
	0.067	814
5 Minutes	0.083	795
	0.1	774
	0.116	755
	0.133	736
	0.15	717
10 minutes	0.167	700
	0.183	685
	0.2	669
	0.217	654
	0.233	641
15 minutes	0.25	628
	0.3	593
	0.333	572
	0.35	563
	0.4	536
	0.416	528
	0.5	491
	0.583	460
	0.6	454
	0.667	433
	0.7	424
	0.8	398
	0.9	376
	1	356
	1.1	339
	1.2	323
	1.3	309
	1.4	296
	1.5	285
	1.6	274
	1.7	264
	1.8	255
	1.9	247
	2	239
	2.1	232
	2.2	225
	2.3	219
	2.4	213
	2.5	207
	2.6	202

Tc (hours)	qu (csm/in)
2.7	197
2.8	192
2.9	187
3	183
3.1	179
3.2	175
3.3	171
3.4	168
3.5	164
3.6	161
3.7	158
3.8	155
3.9	152
4	149
4.1	146
4.2	144
4.3	141
4.4	139
4.5	137
4.6	134
4.7	132
4.8	130
4.9	128
5	126
5.1	124
5.2	122
5.3	120
5.4	119
5.5	117
5.6	115
5.7	114
5.8	112
5.9	111
6	109
6.1	108
6.2	106
6.3	105
6.4	104
6.5	102
6.6	101
6.7	100
6.8	99
6.9	98
7	96

Tc (hours)	qu (csm/in)
7.1	95
7.2	94
7.3	93
7.4	92
7.5	91
7.6	90
7.7	89
7.8	88
7.9	87
8	86
8.1	85
8.2	84
8.3	84
8.4	83
8.5	82
8.6	81
8.7	80
8.8	79
8.9	79
9	78
9.1	77
9.2	76
9.3	76
9.4	75
9.5	74
9.6	74
9.7	73
9.8	72
9.9	72
10	71

*Table of qu values for Ia/P Curve =0.034, listed by Tc, for Type III Storm Distribution
http://www.mass.gov/eea/docs/dep/water/resources/07v5/13wqvwqf.pdf

Available Models

Model to be Used

CDS Model	Typical Internal MH Diameter or Equivalent ID[1] (ft)	Typical Depth[2] Below Pipe Invert (ft)	Treatment Capacity[3] (cfs)	Screen Diameter/ Height (ft)	Maximum Sediment Storage Capacity (CF)
2015_4	4	4.5	1.4	2.0/1.5	50
w/ 1' added sump	4	5.5	1.4	2.0/1.5	63
w/ 2' added sump	4	6.5	1.4	2.0/1.5	75
w/ 3' added sump	4	7.5	1.4	2.0/1.5	88
2015	5	4.7	1.4	2.0/1.5	79
w/ 1' added sump	5	5.7	1.4	2.0/1.5	98
w/ 2' added sump	5	6.7	1.4	2.0/1.5	118
2020	5	5.3	2.2	2.0/2.0	90
w/ 1' added sump	5	6.3	2.2	2.0/2.0	110
w/ 2' added sump	5	7.3	2.2	2.0/2.0	129
2025	5	5.6	3.2	2.0/2.5	97
w/ 1' added sump	5	6.6	3.2	2.0/2.5	117
w/ 2' added sump	5	7.6	3.2	2.0/2.5	136
3020	6	5.4	3.9	3.0/2.0	134
w/ 1' added sump	6	6.4	3.9	3.0/2.0	163
w/ 2' added sump	6	7.4	3.9	3.0/2.0	191
3030	6	6.2	6.1	3.0/3.0	157
w/ 1' added sump	6	7.2	6.1	3.0/3.0	185
w/ 2' added sump	6	8.2	6.1	3.0/3.0	213
4030	8	7.2	7.9	4.0/3.0	329
w/ 1' added sump	8	8.2	7.9	4.0/3.0	379
w/ 2' added sump	8	9.2	7.9	4.0/3.0	429
4040	8	8.3	12.4	4.0/4.0	381
w/ 1' added sump	8	9.3	12.4	4.0/4.0	431
w/ 2' added sump	8	10.3	12.4	4.0/4.0	482

1. Structure diameter represents the typical inside dimension of the concrete structure. Offline systems will require additional concrete diversion components
2. Depth below pipe can vary to accommodate site specific design. Depth below pipe invert represents the depth from the pipe invert to the inside bottom of concrete structure.
3. Treatment Capacity is based on laboratory testing using OK-110 (average d50 particle size of approximately 100 microns) and a 2400 micron screen.

Sediment Depths Indicating Required Servicing*

CDS Model	Sediment Depth (in.)
2015_4	18"
2015	18"
2020	18"
2025	18"
3020	18"
3030	18"
4030	27"
4040	27"
Every 1' of added sump depth	Add 9"

* Based on 75% capacity of isolated sump.

NOAA Atlas 14, Volume 10, Version 3
Location name: South Weymouth, Massachusetts, USA*
Latitude: 42.155°, Longitude: -70.9559°
Elevation: 174.09 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.303** (0.235-0.386)	**0.377** (0.292-0.481)	**0.498** (0.384-0.638)	**0.598** (0.459-0.770)	**0.735** (0.549-0.991)	**0.837** (0.614-1.15)	**0.947** (0.678-1.36)	**1.08** (0.725-1.56)	**1.28** (0.828-1.91)	**1.45** (0.919-2.21)
10-min	**0.429** (0.333-0.547)	**0.534** (0.414-0.681)	**0.705** (0.544-0.902)	**0.846** (0.650-1.09)	**1.04** (0.777-1.40)	**1.19** (0.869-1.63)	**1.34** (0.961-1.92)	**1.53** (1.03-2.21)	**1.82** (1.17-2.71)	**2.06** (1.30-3.13)
15-min	**0.505** (0.392-0.644)	**0.628** (0.487-0.801)	**0.829** (0.640-1.06)	**0.996** (0.765-1.28)	**1.23** (0.915-1.65)	**1.40** (1.02-1.92)	**1.58** (1.13-2.26)	**1.80** (1.21-2.61)	**2.13** (1.38-3.19)	**2.42** (1.53-3.68)
30-min	**0.700** (0.543-0.892)	**0.871** (0.675-1.11)	**1.15** (0.889-1.47)	**1.38** (1.06-1.78)	**1.70** (1.27-2.30)	**1.94** (1.42-2.68)	**2.20** (1.57-3.15)	**2.50** (1.68-3.62)	**2.97** (1.92-4.44)	**3.37** (2.13-5.13)
60-min	**0.895** (0.694-1.14)	**1.11** (0.864-1.42)	**1.47** (1.14-1.89)	**1.77** (1.36-2.28)	**2.18** (1.63-2.94)	**2.49** (1.82-3.43)	**2.81** (2.02-4.03)	**3.21** (2.15-4.64)	**3.81** (2.46-5.69)	**4.32** (2.74-6.57)
2-hr	**1.13** (0.885-1.44)	**1.43** (1.12-1.82)	**1.92** (1.49-2.44)	**2.32** (1.79-2.97)	**2.88** (2.16-3.86)	**3.29** (2.43-4.51)	**3.74** (2.70-5.34)	**4.29** (2.89-6.15)	**5.13** (3.33-7.60)	**5.86** (3.72-8.83)
3-hr	**1.32** (1.03-1.66)	**1.66** (1.30-2.10)	**2.23** (1.73-2.82)	**2.70** (2.09-3.43)	**3.34** (2.52-4.46)	**3.82** (2.83-5.21)	**4.34** (3.14-6.16)	**4.98** (3.36-7.10)	**5.97** (3.88-8.78)	**6.82** (4.34-10.2)
6-hr	**1.72** (1.36-2.16)	**2.15** (1.69-2.69)	**2.84** (2.22-3.57)	**3.41** (2.65-4.31)	**4.20** (3.17-5.55)	**4.78** (3.55-6.46)	**5.41** (3.93-7.61)	**6.18** (4.20-8.73)	**7.37** (4.82-10.7)	**8.40** (5.37-12.4)
12-hr	**2.26** (1.79-2.81)	**2.75** (2.17-3.43)	**3.55** (2.79-4.44)	**4.22** (3.30-5.29)	**5.13** (3.90-6.72)	**5.81** (4.33-7.77)	**6.54** (4.75-9.07)	**7.42** (5.06-10.4)	**8.75** (5.74-12.6)	**9.88** (6.33-14.5)
24-hr	**2.77** (2.20-3.42)	**3.36** (2.66-4.15)	**4.32** (3.42-5.36)	**5.12** (4.02-6.38)	**6.22** (4.74-8.08)	**7.04** (5.27-9.32)	**7.92** (5.77-10.9)	**8.97** (6.14-12.4)	**10.6** (6.95-15.0)	**11.9** (7.66-17.2)
2-day	**3.15** (2.52-3.87)	**3.88** (3.10-4.77)	**5.08** (4.04-6.26)	**6.07** (4.80-7.52)	**7.44** (5.71-9.60)	**8.45** (6.36-11.1)	**9.54** (7.01-13.0)	**10.9** (7.47-14.9)	**12.9** (8.53-18.2)	**14.7** (9.47-21.0)
3-day	**3.45** (2.76-4.22)	**4.24** (3.39-5.18)	**5.52** (4.40-6.78)	**6.59** (5.22-8.12)	**8.06** (6.20-10.4)	**9.14** (6.90-12.0)	**10.3** (7.60-14.0)	**11.8** (8.10-16.0)	**14.0** (9.25-19.6)	**15.9** (10.3-22.6)
4-day	**3.73** (2.99-4.54)	**4.54** (3.64-5.54)	**5.86** (4.68-7.17)	**6.96** (5.53-8.56)	**8.48** (6.53-10.9)	**9.60** (7.26-12.5)	**10.8** (7.97-14.6)	**12.3** (8.48-16.7)	**14.6** (9.66-20.3)	**16.5** (10.7-23.4)
7-day	**4.50** (3.62-5.45)	**5.34** (4.29-6.48)	**6.71** (5.38-8.16)	**7.85** (6.26-9.59)	**9.41** (7.28-12.0)	**10.6** (8.02-13.7)	**11.8** (8.74-15.8)	**13.3** (9.24-18.0)	**15.6** (10.4-21.6)	**17.6** (11.4-24.7)
10-day	**5.21** (4.21-6.29)	**6.07** (4.90-7.34)	**7.48** (6.01-9.07)	**8.65** (6.91-10.5)	**10.3** (7.95-12.9)	**11.5** (8.70-14.7)	**12.7** (9.40-16.9)	**14.3** (9.90-19.1)	**16.5** (11.0-22.7)	**18.4** (12.0-25.7)
20-day	**7.28** (5.92-8.74)	**8.23** (6.68-9.88)	**9.77** (7.90-11.8)	**11.1** (8.88-13.4)	**12.8** (9.95-15.9)	**14.2** (10.7-17.9)	**15.5** (11.4-20.1)	**17.0** (11.9-22.5)	**19.1** (12.8-25.9)	**20.7** (13.5-28.5)
30-day	**9.01** (7.34-10.8)	**10.0** (8.15-12.0)	**11.7** (9.46-14.0)	**13.0** (10.5-15.7)	**14.9** (11.6-18.4)	**16.4** (12.4-20.5)	**17.8** (13.1-22.8)	**19.3** (13.5-25.4)	**21.2** (14.3-28.6)	**22.6** (14.8-31.0)
45-day	**11.2** (9.13-13.3)	**12.3** (10.0-14.6)	**14.0** (11.4-16.8)	**15.5** (12.5-18.6)	**17.5** (13.7-21.5)	**19.1** (14.5-23.7)	**20.7** (15.1-26.1)	**22.1** (15.5-28.8)	**23.8** (16.1-31.9)	**25.1** (16.4-34.1)
60-day	**13.0** (10.6-15.4)	**14.1** (11.6-16.8)	**16.0** (13.0-19.1)	**17.6** (14.2-21.0)	**19.7** (15.4-24.0)	**21.4** (16.3-26.4)	**23.0** (16.8-28.9)	**24.4** (17.2-31.7)	**26.1** (17.6-34.8)	**27.2** (17.9-36.9)

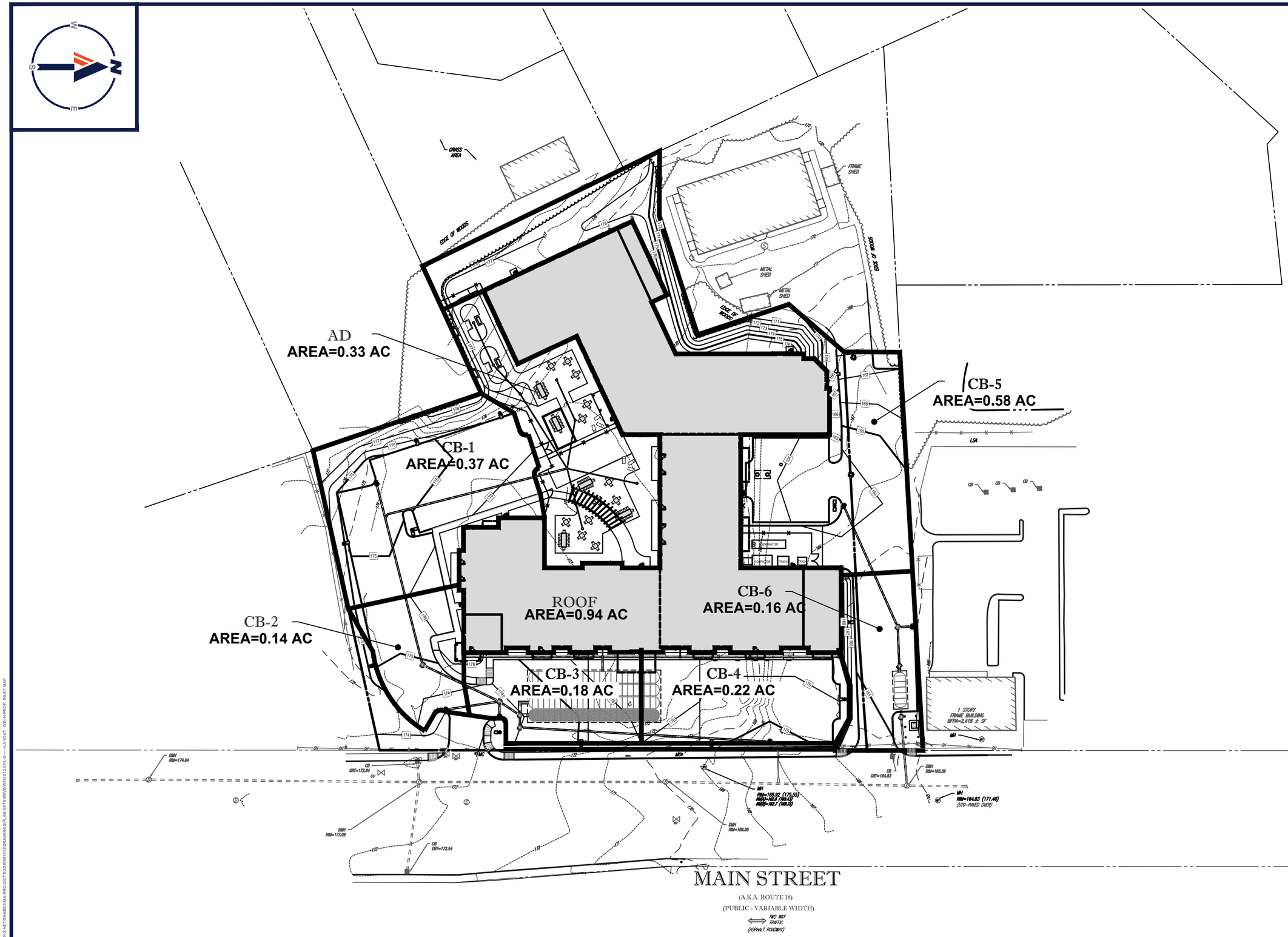
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



BOHLER

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL SERVICES
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	W201012
DRAWN BY:	CFD
CHECKED BY:	RMM
DATE:	12/17/2020
CAD I.D.:	W201012-CVL-0

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

ATLANTIC DEVELOPMENT

PROPOSED
SENIOR LIVING FACILITY

MAP #57, BLOCK #624,
LOTS #12, 13, 29, 30, 31 & 32
1427 - 1449 MAIN STREET
CITY OF WEYMOUTH
NORFOLK COUNTY, MA

BOHLER
352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
www.BohlerEngineering.com

J.G. SWERLING
PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE No. 41692
NEW HAMPSHIRE LICENSE No. 14926
MAINE LICENSE No. 13816
CONNECTICUT LICENSE No. 29185
RHODE ISLAND LICENSE No. 11425

SHEET TITLE:
PROPOSED INLET WATERSHED MAP

SHEET NUMBER:
WS-IN

ORG. DATE - 12/17/2020

Atlantic Development - Weymouth, MA
1435 Main Street
Weymouth, MA
Bohler Job Number: W201012
December 17, 2020

Rational Pipe Sizing Calculations

Design Period Storm:		**25**	**Year**		**Design Period Intensity***		**6.2**	**in/hr**									
LOCATION		IMPERVIOUS			OTHER			SUM	Tc	I	Q	D	S	Material	n	Q Full	V Full
FROM	TO	A	C	CA	A	C	CA	CA	(min)	(in/hr)	(cfs)	(in)	(ft/ft)			(cfs)	(fps)
CB-1	DMH-1	0.25	0.95	0.24	0.12	0.30	0.04	0.27	6	6.2	1.70	12	0.005	HDPE	0.012	2.73	3.47
AD	DMH-1	0.10	0.95	0.10	0.23	0.30	0.07	0.16	6	6.2	1.02	12	0.005	HDPE	0.012	2.73	3.47
DMH-1	DMH-2	0.35	0.95	0.33	0.35	0.30	0.11	0.44	6	6.2	2.71	12	0.005	HDPE	0.012	2.73	3.47
CB-2	DMH-2	0.13	0.95	0.12	0.01	0.30	0.00	0.13	6	6.2	0.78	12	0.018	HDPE	0.012	5.18	6.59
CB-3	DMH-2	0.17	0.95	0.16	0.01	0.30	0.00	0.16	6	6.2	1.02	12	0.050	HDPE	0.012	8.63	10.99
DMH-2	ICS-1	0.65	0.95	0.62	0.37	0.30	0.11	0.73	6	6.2	4.52	12	0.039	HDPE	0.012	7.62	9.70
CB-4	DMH-3	0.21	0.95	0.20	0.01	0.30	0.00	0.20	6	6.2	1.26	12	0.012	HDPE	0.012	4.23	5.38
DMH-3	ICS-1	0.21	0.95	0.20	0.01	0.30	0.00	0.20	6	6.2	1.26	12	0.022	HDPE	0.012	5.72	7.29
ROOF	UG SYST.	0.94	0.95	0.89	0.00	0.30	0.00	0.89	6	6.2	5.54	12	0.030	HDPE	0.012	6.69	8.51
CB-5	DMH-4	0.30	0.95	0.29	0.28	0.30	0.08	0.37	6	6.2	2.29	12	0.005	HDPE	0.012	2.73	3.47
CB-6	DMH-4	0.14	0.95	0.13	0.02	0.30	0.01	0.14	6	6.2	0.86	12	0.005	HDPE	0.012	2.73	3.47
DMH-4	ICS-2	0.44	0.95	0.42	0.30	0.30	0.09	0.51	6	6.2	3.15	12	0.005	HDPE	0.012	2.73	3.47
OCS-1	EXIST. DMH	-	-	-	-	-	-	-	-	-	2.66	12	0.005	HDPE	0.012	2.73	3.47

*Rainfall intensity provided by NOAA ATLAS

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

APPENDIX G: OPERATION AND MAINTENANCE

- *STORMWATER OPERATION AND MAINTENANCE PLAN*
- *INSPECTION REPORT*
- *INSPECTION AND MAINTENANCE LOG FORM*
- *LONG-TERM POLLUTION PREVENTION PLAN*
- *ILLICIT DISCHARGE STATEMENT*
- *SPILL PREVENTION*
- *BMP MAP*

STORMWATER OPERATION AND MAINTENANCE PLAN

Atlantic Development
1435 Main Street
Weymouth, MA

RESPONSIBLE PARTY DURING CONSTRUCTION:

Atlantic Development
1435 Main Street
Weymouth, MA

RESPONSIBLE PARTY POST CONSTRUCTION:

Atlantic Development
1435 Main Street
Weymouth, MA

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the EPA Construction General Permit and the Stormwater Pollution Prevention Plan (SWPPP). Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the SWPPP for this site. The SWPPP also includes information regarding construction period allowable and illicit discharges, housekeeping and emergency response procedures. Upon proper notice to the property owner, the Town/City or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. Parking lots and on-site driveways: Sweep at least four (4) times per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of off-site in accordance with MADEP and other applicable requirements.

2. Catch basins, area drains, manholes and piping: Inspect four (4) times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned four (4) times per year. or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the catch basin or underground system. Accumulated sediment and hydrocarbons present must be removed and properly disposed of off-site in accordance with MADEP and other applicable requirements.

3. Water Quality Unit (Proprietary Separator): Follow manufacturer's recommendations (attached). The owner shall be provided with a copy of the approved Stormwater Operation and Maintenance Plan that shall include a copy of the manufacturers recommended maintenance procedures for the water quality unit

4. Underground Infiltration Basins: Preventative maintenance after every major storm event during the first three (3) months of operation and at least twice per year thereafter. Inspect structure and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for the first three months. The outlet of the basin, if any, shall be inspected for erosion and sedimentation, and rip-rap shall be promptly repaired in the case of erosion. Sediment collecting in the bottom of the basin shall be inspected twice annually, and removal shall commence any time the sediment reaches a depth of six inches anywhere in the basin. Any sediment removed shall be disposed of in accordance with MADEP and other applicable requirements.

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

Atlantic Development
1435 Main Street
Weymouth, MA

RESPONSIBLE PARTY:

Atlantic Development
1435 Main Street
Weymouth, MA

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Catch Basins:	
Discharge Points/ Flared End Sections / Rip Rap:	
Infiltration Basin:	
Water Quality Units:	
Other:	

Note Recommended Actions to be taken on the Following (sediment and/or debris removal, repairs, etc.):
Catch Basins:
Discharge Points / Rip Rap:
Infiltration Basin:
Water Quality Units:
Other:
Other:
Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM

Atlantic Development
1435 Main Street – Weymouth, MA

Stormwater Management Practice	Responsible Party	Date	Maintenance Activity Performed

LONG-TERM POLLUTION PREVENTION PLAN

Atlantic Development
1435 Main Street
Weymouth, MA

RESPONSIBLE PARTY DURING CONSTRUCTION:

Atlantic Development
1435 Main Street
Weymouth, MA

RESPONSIBLE PARTY POST CONSTRUCTION:

Atlantic Development
1435 Main Street
Weymouth, MA

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- No outdoor maintenance or washing of vehicles allowed.
- The property owner shall be responsible for "good housekeeping" including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters).
- Sweeping of driveways a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the "O&M Plan".
- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.

OPERATON AND MAINTENANCE TRAINING PROGRAM

The Owner will coordinate an annual in-house training session to discuss the Operations and Maintenance Plan, the Long-Term Pollution Prevention Plan, and the Spill Prevention Plan and response procedures. Annual training will include the following:

Discuss the Operations and Maintenance Plan

- Explain the general operations of the stormwater management system and its BMPs
- Identify potential sources of stormwater pollution and measures / methods of reducing or eliminating that pollution
- Emphasize good housekeeping measures

Discuss the Spill Prevention and Response Procedures

- Explain the process in the event of a spill
- Identify potential sources of spills and procedures for cleanup and /or reporting and notification
- Complete a yearly inventory or Materials Safety Data sheets of all tenants and confirm that no potentially harmful chemicals are in use.
- Trash and other debris shall be removed from all areas of the site at least twice yearly.
- In no case shall snow be disposed of or stored in resource areas (wetlands, floodplain, streams or other water bodies).
- If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.

ILLICIT DISCHARGE STATEMENT

Certain types of non-stormwater discharges are allowed under the U.S. Environmental Protection Agency Construction General Permit. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Any existing illicit discharges, if discovered during the course of the work, will be reported to MassDEP and the local DPW, as applicable, to be addressed in accordance with their respective policies. No illicit discharges will be allowed in conjunction with the proposed improvements.

Duly Acknowledged:

_____

Name & Title

SPILL PREVENTION AND RESPONSE PROCEDURES (POST CONSTRUCTION)

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

2. The minimum practical quantity of all such materials will be kept on site.

3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.

4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)

2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

3. For spills greater than five (5) gallons of material immediately contact the MADEP at the toll-free 24-hour statewide emergency number: **1-888-304-1133**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided, or similar).

4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within 14 days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

SPILL PREVENTION CONTROL AND COUNTERMEASURE FORM

Atlantic Development
1435 Main Street
Weymouth, MA

Where a release containing a hazardous substance occurs, the following steps shall be taken by the facility manager and/or supervisor:

1. Immediately notify The Weymouth Fire Department (at **9-1-1**)

2. All measures must be taken to contain and abate the spill and to prevent the discharge of the pollutant(s) to off-site locations, receiving waters, wetlands and/or resource areas.

3. Notify the Weymouth Board of Health at (781) 335-2000 and the Conservation Commission.

4. Provide documentation from licensed contractor showing disposal and cleanup procedures were completed as well as details on chemicals that were spilled to the City of Weymouth Board of Health and Conservation Commission.

Date of spill:_____ Time:_____ Reported By:_____

Weather Conditions:_____

Material Spilled	**Location of Spill**	**Approximate Quantity of Spill (in gallons)**	**Agency(s) Notified**	**Date of Notification**

Cause of Spill:_____
_____

Measures Taken to Clean up Spill:_____
_____

Type of equipment: _____ Make: _____ Size:_____

License or S/N: _____

Location and Method of Disposal_____
_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring:_____
_____

Additional Contact Numbers:

- DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) EMERGENCY PHONE: 1-888-304-1133
- NATIONAL RESPONSE CENTER PHONE: (800) 424-8802
- U.S. ENVIRONMENTAL PROTECTION AGENCYPHONE: (888) 372-7341

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH®
ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

StormTech®

Detention • Retention • Water Quality

A division of ADS

Save Valuable Land and Protect Water Resources

Isolator® Row O&M Manual

StormTech® Chamber System for Stormwater Management

1.0 The Isolator® Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patented technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC-310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

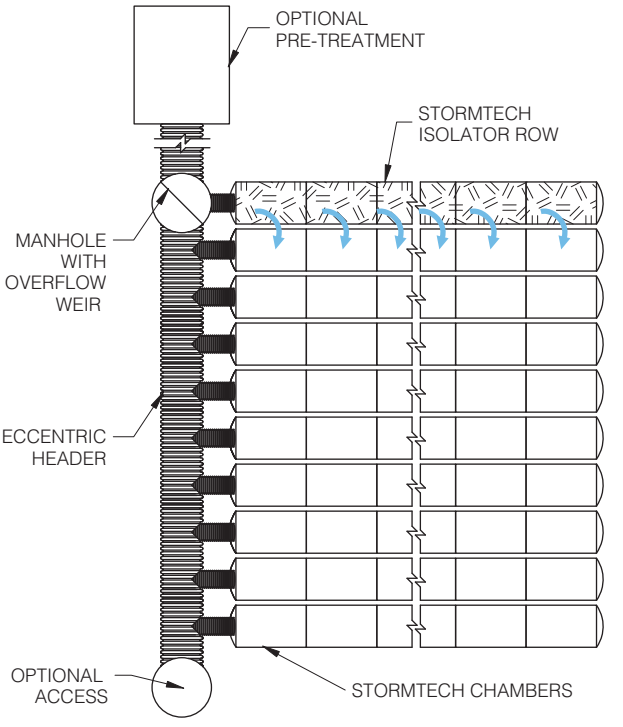
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.0 Isolator Row Inspection/Maintenance

2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

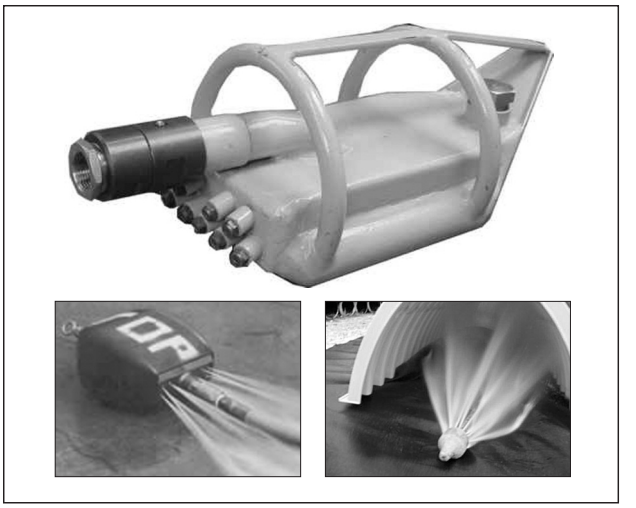
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

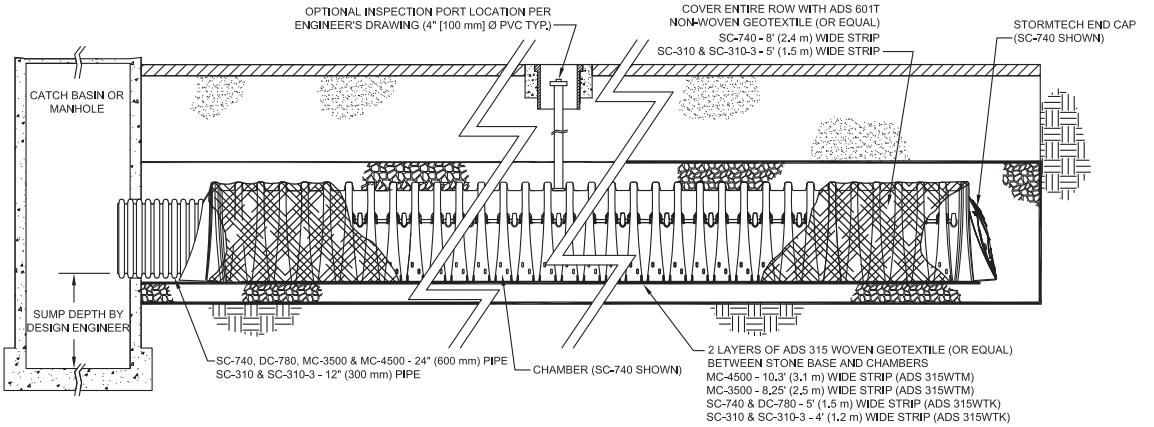
The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)



NOTE: NON-WOVEN FABRIC IS ONLY REQUIRED OVER THE INLET PIPE CONNECTION INTO THE END CAP FOR DC-780, MC-3500 AND MC-4500 CHAMBER MODELS AND IS NOT REQUIRED OVER THE ENTIRE ISOLATOR ROW.

3.0 Isolator Row Step By Step Maintenance Procedures

Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows

i. Remove cover from manhole at upstream end of Isolator Row

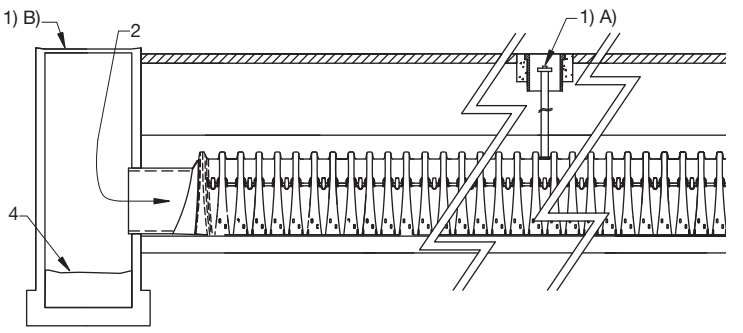
ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Mirrors on poles or cameras may be used to avoid a confined space entry

2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

StormTech Isolator Row (not to scale)



Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

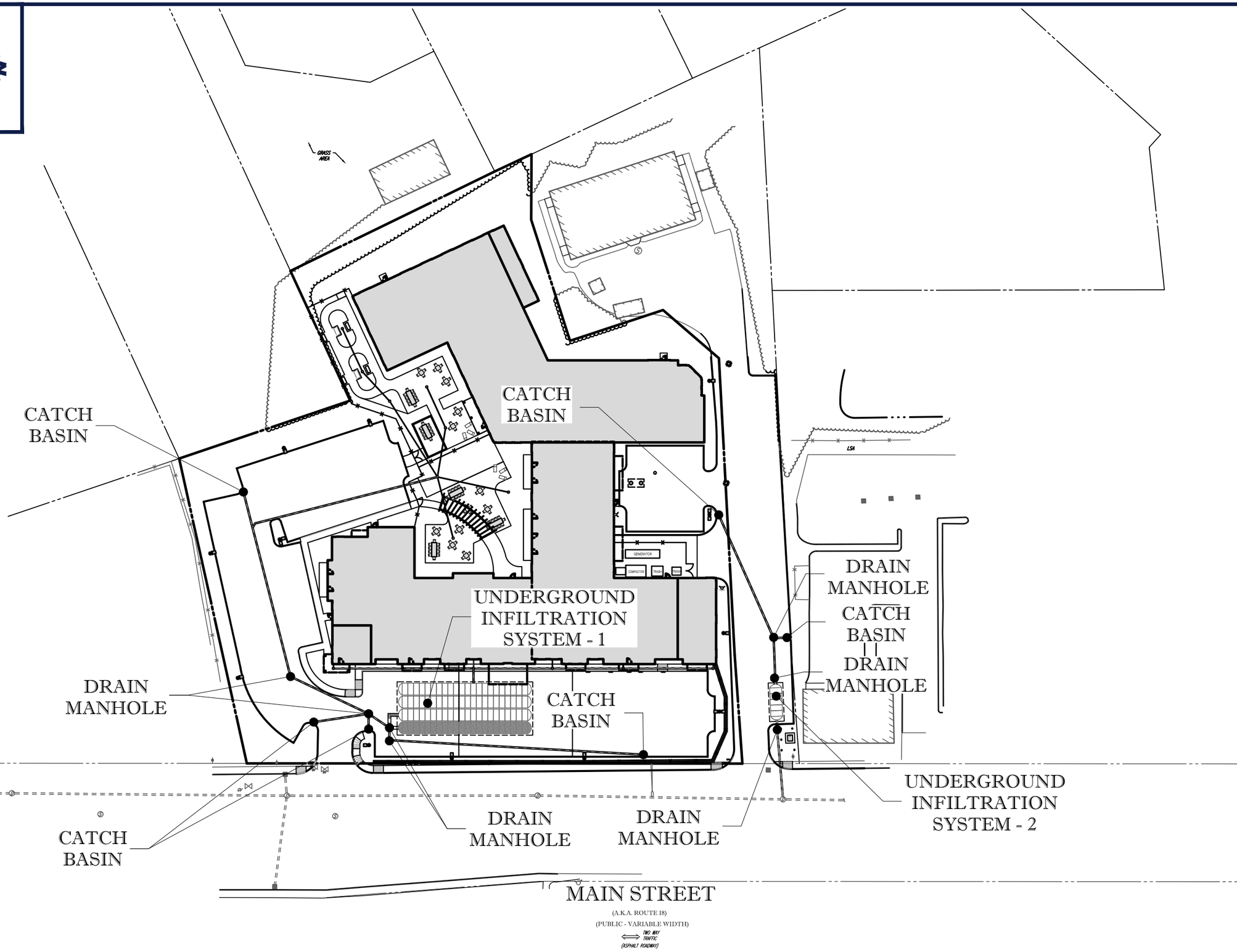
StormTech®

Detention • Retention • Water Quality

A division of ADS

70 Inwood Road, Suite 3 | Rocky Hill | Connecticut | 06067

860.529.8188 | 888.892.2694 | fax 866.328.8401 | www.stormtech.com



BOHLER

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
FACILITY AND ESTATE MANAGEMENT
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

811 Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	W201012
DRAWN BY:	CFD
CHECKED BY:	RMM
DATE:	12/17/2020
CAD I.D.:	W201012-CVL-0

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

ATLANTIC DEVELOPMENT

PROPOSED
SENIOR LIVING FACILITY

MAP #57, BLOCK #624,
LOTS #12, 13, 29, 30, 31 & 32
1427 - 1449 MAIN STREET
CITY OF WEYMOUTH
NORFOLK COUNTY, MA

BOHLER
352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
www.BohlerEngineering.com

J.G. SWERLING
PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE No. 41659
NEW HAMPSHIRE LICENSE No. 14626
MAINE LICENSE No. 13816
CONNECTICUT LICENSE No. 28765
RHODE ISLAND LICENSE No. 11425

SHEET TITLE:

BMP MAP

SHEET NUMBER:

BMP

ORG. DATE - 12/17/2020