Stormwater Analysis & Report

For

McDonald Keohane Funeral Home
809 Main Street
Weymouth, MA

February 4, 2022

Revised August 24, 2022
Revised October 12, 2022

Prepared for:
McDonald Keohane Funeral Home, Inc.
785 Hancock Street
Quincy, MA 02170

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10-12-2022

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SECTION 1 - NARRATIVE

1.1 EXECUTIVE SUMMARY

In accordance with the provisions of the Town of Weymouth Zoning Bylaws, the Applicant, McDonald-Keohane Funeral Home, Inc. proposes a new 5,370 +/- sf building addition off the rear of the existing building on the subject property. Site renovations include a reconfigured parking lot, a new accessory garage (1,560+/- sf) as well as upgrades to the stormwater management system, utilities and landscaping.

The site is bound to the east by Main Street (Route 18 – State Highway Layout), Cypress Street (town Right-of-Way) to the east, commercial property to the north (owned by South Shore Hospital), and several residential properties to the south. The 2.82 +/- acre site consisted of 3 parcels which were utilized as an active funeral home, an existing residential home and a vacant wooded lot. These parcels have been combined via ANR which was endorsed by the Planning board on December 3, 2021.

The site topography ranges from a high of approximately 190 in the center of the site to an approximate low of 170 in the northeastern corner abutting Main Street and elevation 173+/- westerly in the northwest corner abutting Cypress Street. The property has active vehicular access via Main Street through two (2) one-way driveways. Vehicles enter the funeral home facility at the northern curb cut on Main Street and depart the facility via the one-way out driveway connection in the southeast corner of the property. These access points will be retained and will remain as the connections for the improved site. Internal driveway widths will be improved to provide for minimum 20’ wide. In addition, the existing access driveway via Cypress Street will be eliminated along with the demolition of the existing single-family residence along Cypress Street

The property is within two (2) Zoning districts including Medical Service (fronting on Main Street) and R-1 (Fronting on Cypress Street). The site located within the Watershed Protection District but not the Groundwater Protection District according to the Town of Weymouth Zoning Map revised to January 1, 2018. The site is entirely outside of the FEMA 100-year floodplain. The site is not located within an NHESP Estimated or Priority Habitat, nor located in an ACEC nor Critical Area. Refer to Section 1.9 - Figures for the accompanying figures. The site not located within a Zone II.

The Project will implement significant stormwater improvements and BMPs where very little infrastructure exists on the site today as is further described throughout this report, and has been designed in accordance with the Massachusetts Stormwater Handbook.

1.2 OBJECTIVE OF CALCULATIONS

The purpose of this stormwater analysis is to examine the stormwater runoff from the proposed site based upon the Massachusetts Department of Environmental Protection Stormwater Management Policy and the applicable provisions of the Town of Weymouth Bylaws and regulations.

The goal of the stormwater management system design on this project is to provide improved water quality, ensure post-development peak runoff rates do not exceed pre-development peak flow rates, maximize the opportunities for recharge and infiltration, and protect the surrounding area from any potential flooding and/or environmental impacts associated with the unmitigated condition. The following stormwater hydrology calculations were performed using the 2-year, 10-year, 25-year, and 100-year frequency, 24-hour NOAA Atlas 14 design storm events and were compared for both pre-development and post-development conditions.

1.3 METHODOLOGY

We utilized the latest version of HydroCAD for the overall stormwater hydrology/routing analysis to assess and compare peak rates of runoff at the various discharge points from the subject property.

Refer to Section 3 – HydroCAD Model, which includes the detailed print-out of the HydroCAD Model Reports for the 2, 10, 25 and 100-year storms as well as Section 7 – Pipe Analysis / Sizing, which includes the calculations for the 25-year storm for pipe capacity analysis and sizing.

1.4 ON-SITE SOIL INFORMATION

The Natural Resource Conservation Service (NRCS) maps the majority of the on-site soil as Woodbridge Urban Land complex, 3 to 15 percent slopes, Soil Map Unit 623C, Classified as Hydrologic Soil Group (HSG) “C/D”. This soil is primarily representative in the location of the proposed development. According to the NRCS mapping there are also two (2) other soils present on the western and southerly portions of the site; Canton-Urban Land complex, Soil Map 628C and Urban Land, Soil Map 602. The soils within this area of the proposed development have “A” HSG Ratings, and this rating is what was used for the drainage calculations enclosed within this permit submission.

A test pit plan and associated logs, observed by Crocker Design Group on November of 2020 as well as August 22, 2022 are enclosed in Section 6. Please refer to Section 6 for complete soil information.

1.5 SITE HYDROLOGY

Existing Conditions

Please refer to the attached Pre-Construction Watershed Plan in Section 3.3. The property has been divided into several sub catchment areas based on the existing site topography and flow paths. These sub catchments then combine where appropriate from an analysis standpoint where they discharge toward adjacent rights-of-way and abutting residential and commercial properties. Each sub catchment area has been analyzed and assigned an appropriate Curve Number to represent the existing vegetative cover and underlying soils conditions. Appropriate Times of Concentration and Curve Numbers have been assigned for each catchment area. This data was then input into HydroCAD to determine peak rates of runoff at the various design points (identified as "Points of Discharge") which provide the locations for which to compare existing versus proposed conditions to document compliance that the peak rates do not increase in the regulatory storm events as required. A Summary table is provided in the Hydrology Model Results and Conclusions Section below.

For the purposes of this analysis, the pre- and post- development drainage conditions were analyzed at five (5) "design points" where stormwater runoff currently drains to under existing conditions. The design points are described below:

- Design Point #1 (Sub 1) is towards the northerly property line.

- Design Point #2 (Sub 2A/2B/2C) is towards Main Street ROW (Route 18) and ultimately ends up flowing into the Main Street drainage system. We note a portion of the existing pavement within the existing upper parking lot collects in two existing catch basins, who's ultimate discharge point is unknown. As a result, the analysis identifies the subcatchment area is assumed to result in zero runoff toward any property line.

- Design Point #3 (Sub 3) is discharging towards the northerly property line.

- Design Point #4 (Sub 4) is discharging towards the southerly property line.

- Design Point #5 (Sub 5A/5B) is flowing from the high point in the center of the property and ultimately discharging out to Cypress Street which has no formal drainage system.

The analyzed watershed consists of approximately 2.82 +/- acres of both developed land and undeveloped wooded area. The site conveys most of its stormwater to the Main Street ROW drainage system, while the rest of the site appears to convey stormwater to the

wooded area at the rear of the site and out Cypress Street. A more comprehensive description of the existing sub catchment areas is provided below.

- Subcatchment 1 consists of an existing landscape/grass area. The runoff from this subcatchment drains towards the abutting commercial property to the north of the site (DP1) and currently discharges to the northerly property line. This area is a landscape area (CN: 39) and the time of concentration was calculated to be 6.6

- Subcatchment 2A is existing bituminous pavement, roof, and landscape area (CN:78) that currently flows and discharges to Main Street ROW (Route 18). The minimum time of concentration of 6 minutes was used.

- Subcatchment 2B is the existing exit which is comprised of bituminous pavement and landscape area (CN: 70) which also flows to Main Street ROW (Route 18). The minimum time of concentration of 6 minutes was used.

- Subcatchment 2C is a combination of pavement and roof that drains into 2 existing catch basins whose discharges are unknown. This area is mainly impervious (CN: 90) and the minimum time of concentration of 6 minutes was used.

- Subcatchment 3 is a combination of the garage roof that drains towards the northerly property line and the landscape area. This area is mainly impervious (CN: 71) and the minimum time of concentration of 6 minutes was used.

- Subcatchment 4 is existing wooded area. The stormwater in this subcatchment flows towards the abutting residential properties. This area is wooded (CN: 33) and the time of concentration was calculated to be 23.4 minutes.

- Subcatchment 5A is an existing wooded area and backyard. The stormwater in this subcatchment drains towards Cypress Street. This is an area of woods/grass (CN: 33) and has a calculated time of concentration of 12.0 minutes.

- Subcatchment 5B is an existing home and landscaped front yard. The stormwater in this subcatchment drains towards Cypress Street. This area consists of a combination of impervious surfaces and lawn area (CN: 76) and has a calculated time of concentration of 6 minutes.

Proposed Conditions

The proposed project consists of the construction a building addition and accessory garage. The project site includes a parking lot, drainage improvements and utility infrastructure. The parking lot has been designed to drain to deep hooded catch basins, which will capture and convey stormwater runoff, via underground pipe system to an underground system.

Please refer to the attached Post-Construction Watershed Plan in Section 3.3. The proposed project has been divided into several sub catchment areas and the stormwater underground infiltration/retention system chambers has been modeled. Appropriate Times of Concentration and Curve Numbers have been assigned for each catchment area. A Summary table is provided in the Hydrology Model Results and Conclusions Section below.

- Subcatchment 1 consists of an existing landscape/grass area. The runoff from this subcatchment drains towards the northerly property line of the site (DP1). This area is a grass area (CN: 40) and the minimum time of concentration of 6 minutes is used.

- Subcatchment 2A is consists of roof and bituminous pavement and small landscaped areas. The stormwater runoff from this area has been reduced from its existing condition but a small amount discharges to Main Street ROW (Route 18). This area is mainly impervious (CN: 75) and the minimum time of concentration of 6 minutes is used.

- Subcatchment 2B consists of bituminous pavement and a small landscape area. The stormwater in this subcatchment overland flows towards the Main Street ROW, eventually ending up in the Main Street drainage system. The area is combination of pavement and landscape area (CN: 71) and the minimum time of concentration of 6 minutes is used.

- Subcatchment 3 is a small grass area. The stormwater in this subcatchment overland flows toward the northerly property line. The grass area and woods (CN:48) has a calculated time of concentration of 6 minutes.

- Subcatchment 4 consists of mostly woods with a small grass area. The stormwater in this subcatchment overland flows towards the southerly property line. The grass area and woods (CN:34) has a calculated time of concentration of 8.7 minutes.

- Subcatchment 5A consists of bituminous parking areas, the proposed building addition and accessory garage and small landscape areas. The building addition and garage are proposed to have an underground roof drain system which will discharge to UG-1. The rest of the runoff throughout 5A will be captured by deep

sump catch basins, a series of pipes and manholes, and a water quality unit before discharging to the infiltration system UG-1. This area is mostly impervious (CN: 96) and the minimum time of concentration of 6 minute is used.

- Subcatchment 5B consists of bituminous parking areas, the proposed building addition and small landscape areas. The building addition is proposed to have an underground roof drain system which will discharge to UG-2. The rest of the runoff throughout 5B will be captured by deep sump catch basins, a series of pipes and manholes, and a series of water quality units before discharging to the infiltration system UG-2. This area is mostly impervious (CN: 89) and the minimum time of concentration of 6 minute is used.

- Subcatchment 5C consists of grass/woods area. Stormwater will discharge towards Cypress Street. This area is pervious (CN: 34) and has a time of concentration of 10.3 minutes.

- Subcatchment 5D consists of grass and landscape area and the existing home. A minimal amount of stormwater will discharge to Cypress Street. This area is landscaped (CN: 73) and has the minimum time of concentration of 6 minutes.

- Subcatchment 5E consists of an existing garage and will discharge to a concrete drywell. This area is completely impervious but free of suspended solids (CN:98) and has the minimum time of concentration of 6 minutes.

Hydrology Model Results and Conclusions

The goal of the stormwater design for the project is to fully comply with the Massachusetts Stormwater Policy and the Town of Weymouth Regulations. This analysis confirms that the stormwater system is receiving proper treatment and peak rates of runoff do not exceed the pre-development rates using stormwater Best Management Practices including deep sump hooded catch basins, water quality units, and an underground ADS Infiltration/Retention system.

The emergency overflow from the underground infiltration/recharge systems is controlled by weir walls with a height equal to the peak elevation of the system during a 100-yr storm event. The emergency discharge outlets for both systems are catch basins in the front parking lot positioned to discharge toward Main Street.

The results of the pre- and post-development hydrology calculations provided in Section 3 are summarized in the following table:

Table 1.5.1 shows the peak rate of runoff for the existing site as well as the developed site at the 2, 10 and 100- year design storms.

PEAK RATE OF DISCHARGE									
	2-Year Storm Event (CFS)			10-Year Storm Event (CFS)			100-Year Storm Event (CFS)		
Design Points	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP-1	0.00	0.00	0.00	0.01	0.00	-0.01	0.17	0.08	-0.09
DP-2	1.51	1.09	-0.42	3.12	2.39	-0.73	5.83	4.64	-1.19
DP-3	0.03	0.00	-0.03	0.07	0.01	-0.06	0.15	0.05	-0.1
DP-4	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0
DP-5	0.30	0.23	-0.07	0.62	0.51	-0.11	1.22	1.09	-0.13

Table 1.5.2 shows the peak volume for the existing site as well as the developed site at the 2, 10 and 100- year design storms.

PEAK VOLUME									
	2-Year Storm Event (CF)			10-Year Storm Event (CF)			100-Year Storm Event (CF)		
Design Points	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP-1	2	2	0	133	65	-68	666	299	-367
DP-2	4,326	3,157	-1,169	8,890	6,790	-2,100	16,974	13,377	-3,597
DP-3	91	8	-83	207	45	-162	424	144	-280
DP-4	0	0	0	36	32	-4	415	294	-121
DP-5	846	655	-191	1,957	1,632	-325	5,554	4,690	-864

As can be seen based on the above tables, the peak stormwater runoff rates and volumes generated by the development are the same or less in post development conditions versus the existing conditions in all cases. Refer to Section 3 for copies of the HydroCAD Analysis that document the above results as well as the Pre and Post Construction Watershed Plans attached.

1.6 STORMWATER MANAGEMENT

The following section describes each of the nine (9) Massachusetts Stormwater Management Standards and describes how the project complies with each.

Standard 1: No New Untreated Discharges – No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

No new stormwater conveyances are proposed. The drainage system has been designed to direct stormwater runoff from all new paved areas through stormwater BMPs designed to capture, convey, treat, retain, recharge and infiltrate the runoff. The project also reduces the amount of existing pavement surface runoff toward Route 18 compared to the existing condition.

Standard 2: Peak Rate Attenuation – Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

The stormwater BMPs employed either reduce or maintain pre-development peak rates as required.

Standard 3: Recharge – Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The stormwater system has been designed to comply with the recharge requirements for both the MA Stormwater Management Regulations. Refer to Section 4 for a summary of the stormwater recharge calculations.

Standard 4: Water Quality – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The project utilizes deep sump hooded catch basins, CDS water quality units, and a concrete drywell to fully comply with the TSS removal requirements of 80% removal. In addition, deep sump hooded catch basins and water quality units are proposed for pre-treatment. Calculations for water quality volume can be found in Section 4.3, and treatment train efficiency can be found in Section 4.4. A long Term Operation and Maintenance Manual for these systems can be found in Section 5.

Standard 5: Land Uses with Higher Potential Pollutant Loads – For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The project is not considered a LUHPL (Land Use with Higher Potential Pollutant Load).

Standard 6: Critical Areas – Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

The project is located within the Town of Weymouth Watershed Protection District. The BMP's have been designed to provide 80% TSS removal prior to infiltration.

Standard 7: Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable – A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The project qualifies as partial redevelopment and partial new development. All new impervious areas, as well as a portion of the existing impervious areas will now receive full treatment compared to the existing untreated conditions. The extent of existing, untreated impervious area has been reduced with this design.

Standard 8: Construction Period Pollution Prevention Plan and Erosion and Sedimentation Control – A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans.

Standard 9: Operation and Maintenance Plan – A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A long-term Operation and Maintenance Plan has been incorporated herein. See Section 5.

Standard 10: Prohibition of Illicit Discharges – All illicit discharges to the stormwater management system are prohibited.

An Illicit Discharge Compliance Statement is included as required.

1.7 BEST MANAGEMENT PRACTICES (BMP'S)

A system of deep sump hooded catch basins, water quality units, and a subsurface infiltration system are to be used to treat stormwater runoff on the site. See Section 4 for stormwater management calculations.

1.8 PIPE SIZING

Refer to Section 7 for the pipe sizing calculation results. The tributary area for each inlet/subcatchment area has been computed along with pipe length, slope and friction coefficient. The Rational Method is the utilized to determine the hydraulic grade line. For design purposes, this approach was used to size the pipes such that the 25-year storm event is contained within the pipe. In addition, pipe velocities were checked to be within the range of 3fps to 11 fps. Those calculations are included in Section 7 herein.

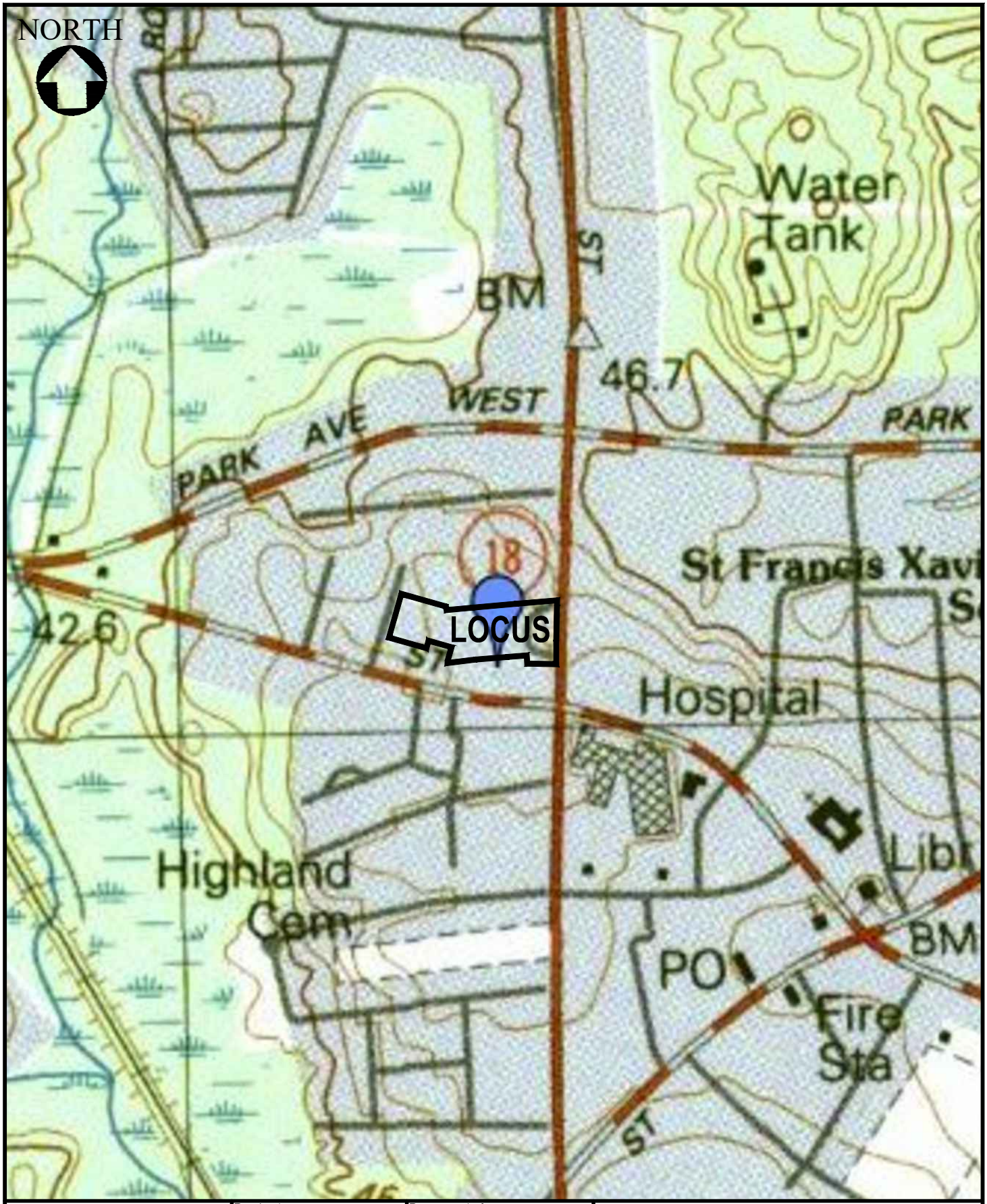
1.9 CONCLUSION

In conclusion, the project has been designed in accordance with the requirements of the MA Stormwater Management Regulations and in compliance with the Town of Weymouth Regulations.

1.10 FIGURES

The following pages contain the following accompanying figures:

FIG 1 SITE LOCUS USGS MAP
FIG 2 SITE LOCUS ORTHOGRAPHIC MAP
FIG 3 NHESP HABITAT MAP
FIG 4 FEMA FLOODPLAIN MAP
FIG 5 MASSDEP WETLANDS MAP



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Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043

Project

MCDONALD-KEOHANE FUNERAL HOME - SOUTH

809 MAIN STREET
WEYMOUTH, MA 02190

Prepared for

MCDONALD-KEOHANE

785 HANCOCK STREET
QUINCY, MA 02170

Drawing Title

AERIAL MAP

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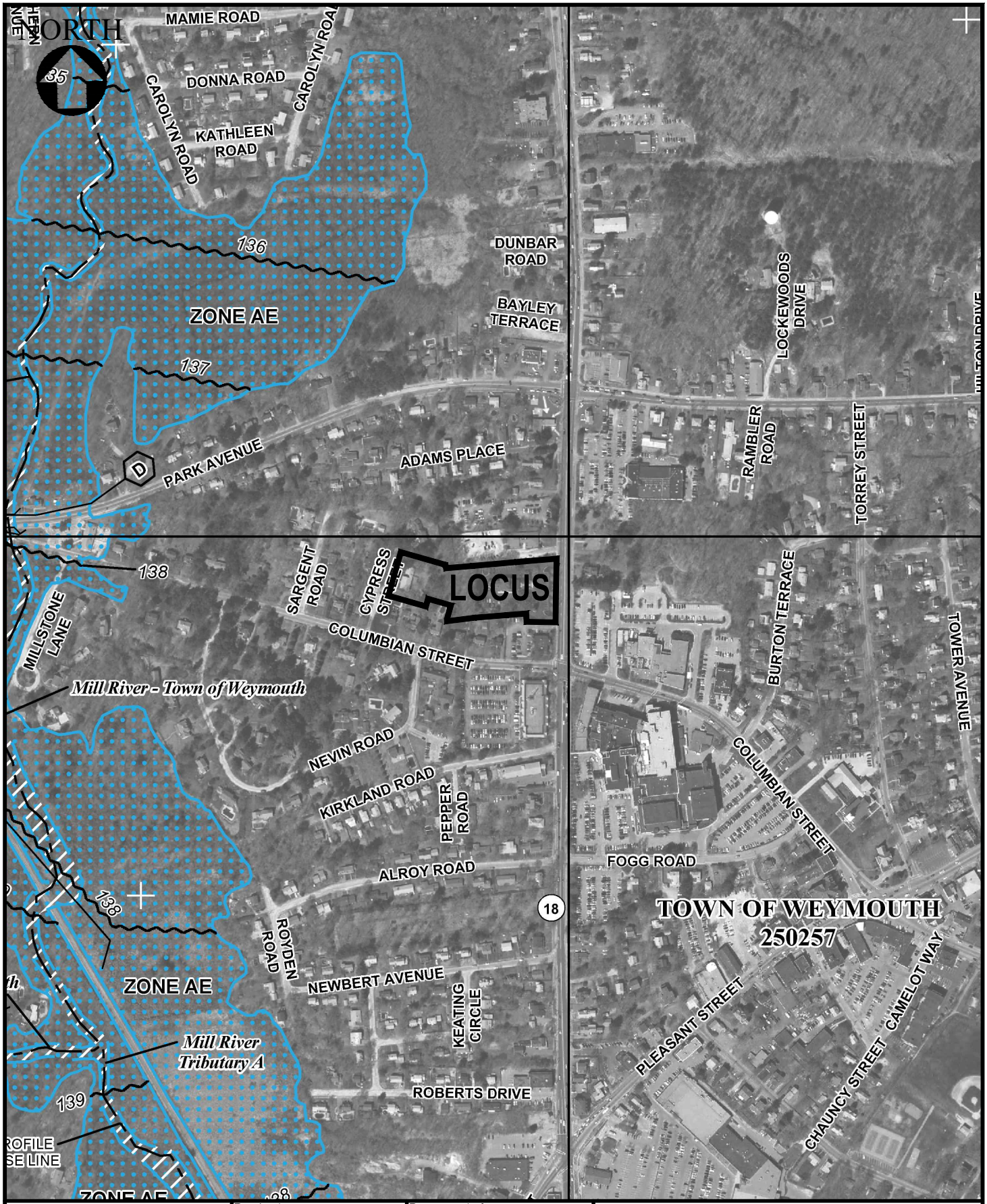

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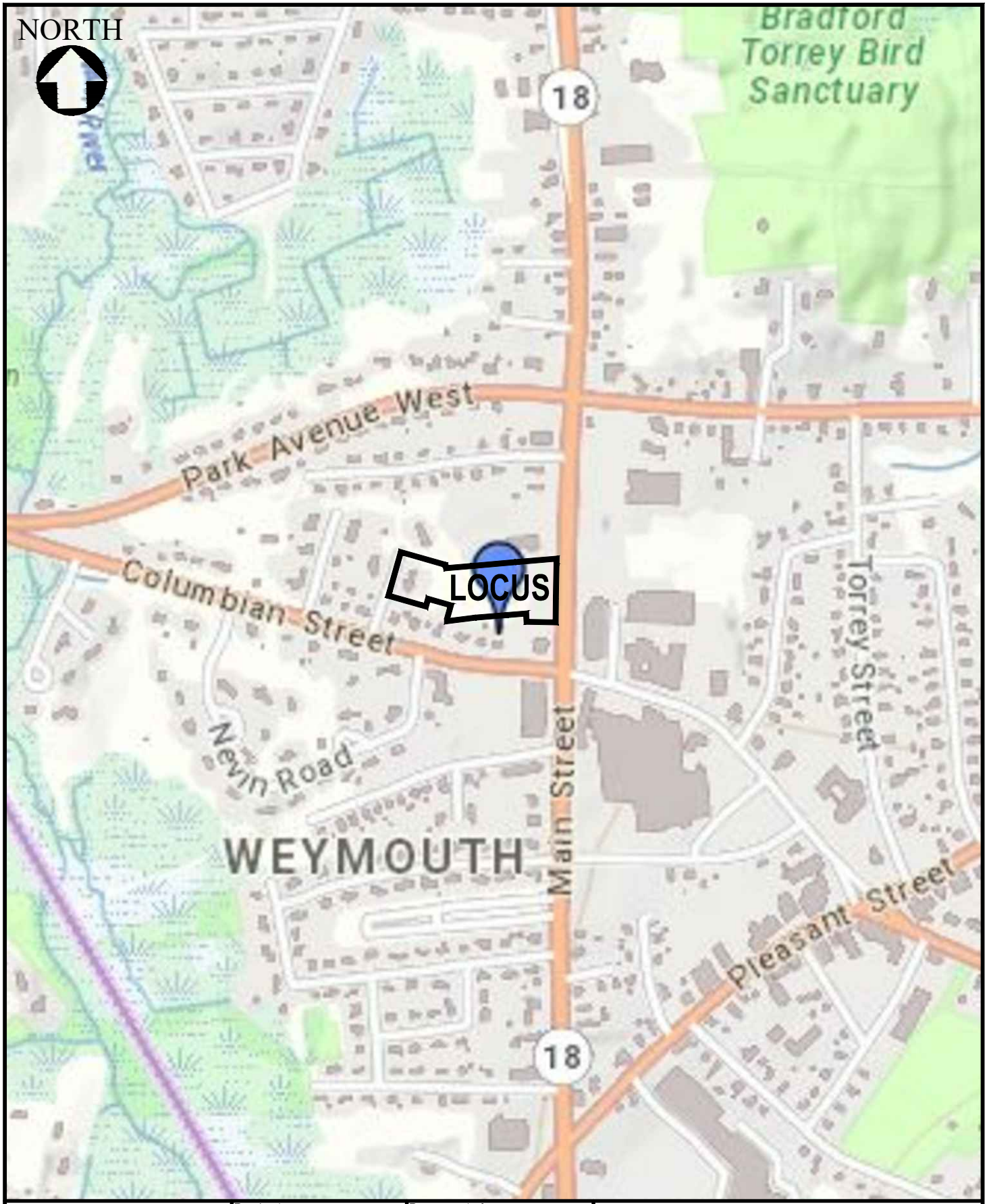

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MCDONALD-KEOHANE

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Drawing Title

WETLAND MAP

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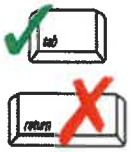
SECTION 2 – STORMWATER CHECKLIST

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

10/12/22
Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Standard 10: Massachusetts Stormwater Standards Handbook

Illicit discharges are defined as discharges into waters of the State or municipal separate stormwater system (MS4) that are not entirely comprised of stormwater. Exclusions for non-stormwater discharges into drainage systems include activities or facilities for firefighting, water line flushing, landscape irrigation, uncontaminated groundwater discharge, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, water used to clean residential buildings without detergents, water used for street washing, and flows from riparian habitats/wetlands. These exclusions are subject to change and are under the discretion of the local governing authority.

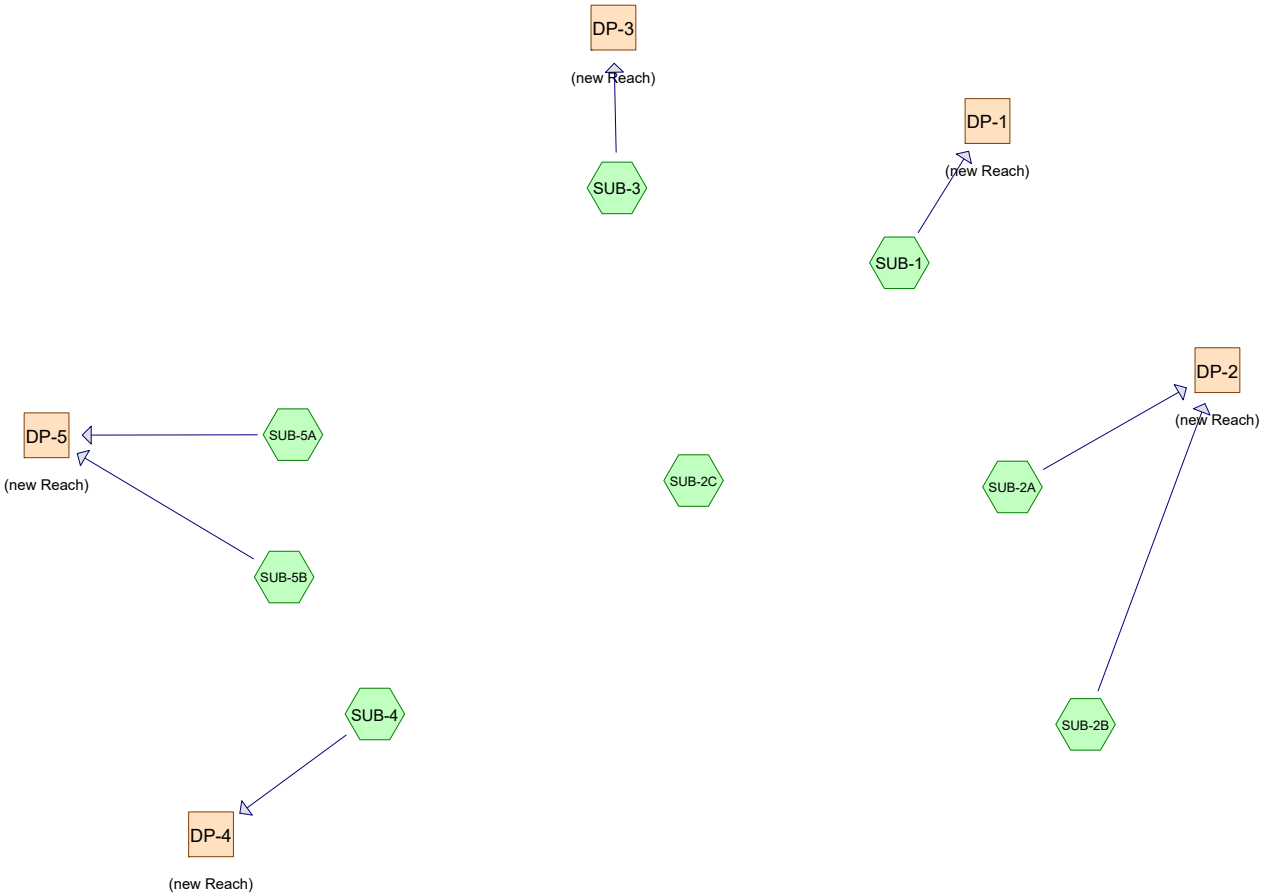
To the best of our knowledge and professional belief no illicit discharges to the stormwater system, surface waters, or wetland resource areas will remain on the site after construction. We will agree to implement a pollution prevention plan to prevent illicit discharges into the stormwater management system. The design of the site based on the plans entitled "SITE PLANS: MACDONALD-KEOHANE FUNERAL HOME - SOUTH." prepared by Crocker Design Group, 2 Sharp Street Unit B, Hingham, Massachusetts show a separation and no direct connection between the stormwater management systems and the wastewater and/or groundwater on the site. To the maximum extent practicable, the design prevents entry of illicit discharges into the stormwater management system.

Engineer's Name: _____
(please print)

Engineer's Signature: _____ Date: _____

Company: Crocker Design Group, LLC.

SECTION 3 – STORMATER HYDROLOGY MODEL



Subcat Reach Pond Link

Routing Diagram for Existing
Prepared by HP Inc., Printed 10/11/2022
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
43,623	39	>75% Grass cover, Good, HSG A (SUB-1, SUB-2A, SUB-2B, SUB-2C, SUB-3, SUB-4, SUB-5A, SUB-5B)
1,576	98	Concrete, HSG A (SUB-1, SUB-2A, SUB-2B, SUB-2C)
37,977	98	Paved parking, HSG A (SUB-2A, SUB-2B, SUB-2C, SUB-5A, SUB-5B)
8,401	98	Roofs, HSG A (SUB-2A, SUB-2C, SUB-3, SUB-5B)
31,510	30	Woods, Good, HSG A (SUB-4, SUB-5A)
123,087	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
123,087	HSG A	SUB-1, SUB-2A, SUB-2B, SUB-2C, SUB-3, SUB-4, SUB-5A, SUB-5B
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
123,087		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
43,623	0	0	0	0	43,623	>75% Grass cover, Good	
1,576	0	0	0	0	1,576	Concrete	
37,977	0	0	0	0	37,977	Paved parking	
8,401	0	0	0	0	8,401	Roofs	
31,510	0	0	0	0	31,510	Woods, Good	
123,087	**0**	**0**	**0**	**0**	**123,087**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=6,980 sf 0.42% Impervious Runoff Depth=0.00"
Flow Length=114' Tc=6.6 min CN=39 Runoff=0.00 cfs 2 cf

Subcatchment SUB-2A: Runoff Area=34,554 sf 65.93% Impervious Runoff Depth=1.39"
Tc=6.0 min CN=78 Runoff=1.41 cfs 4,008 cf

Subcatchment SUB-2B: Runoff Area=4,137 sf 52.50% Impervious Runoff Depth=0.92"
Tc=6.0 min CN=70 Runoff=0.11 cfs 318 cf

Subcatchment SUB-2C: Runoff Area=20,050 sf 86.41% Impervious Runoff Depth=2.32"
Tc=6.0 min CN=90 Runoff=1.32 cfs 3,872 cf

Subcatchment SUB-3: Runoff Area=1,118 sf 54.92% Impervious Runoff Depth=0.98"
Tc=6.0 min CN=71 Runoff=0.03 cfs 91 cf

Subcatchment SUB-4: Runoff Area=7,896 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=131' Tc=23.4 min CN=33 Runoff=0.00 cfs 0 cf

Subcatchment SUB-5A: Runoff Area=40,322 sf 0.04% Impervious Runoff Depth=0.00"
Flow Length=351' Tc=12.0 min CN=33 Runoff=0.00 cfs 0 cf

Subcatchment SUB-5B: Runoff Area=8,030 sf 62.45% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=76 Runoff=0.30 cfs 846 cf

Reach DP-1: (new Reach) Inflow=0.00 cfs 2 cf
Outflow=0.00 cfs 2 cf

Reach DP-2: (new Reach) Inflow=1.51 cfs 4,326 cf
Outflow=1.51 cfs 4,326 cf

Reach DP-3: (new Reach) Inflow=0.03 cfs 91 cf
Outflow=0.03 cfs 91 cf

Reach DP-4: (new Reach) Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach DP-5: (new Reach) Inflow=0.30 cfs 846 cf
Outflow=0.30 cfs 846 cf

Total Runoff Area = 123,087 sf Runoff Volume = 9,137 cf Average Runoff Depth = 0.89"
61.04% Pervious = 75,133 sf 38.96% Impervious = 47,954 sf

Summary for Subcatchment SUB-1:

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 2 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	6,951	39	>75% Grass cover, Good, HSG A
*	29	98	Concrete, HSG A
	6,980	39	Weighted Average
	6,951		99.58% Pervious Area
	29		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.36"
0.3	64	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.6	114	Total			

Summary for Subcatchment SUB-2A:

Runoff = 1.41 cfs @ 12.13 hrs, Volume= 4,008 cf, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	18,983	98	Paved parking, HSG A
	11,772	39	>75% Grass cover, Good, HSG A
	2,770	98	Roofs, HSG A
*	1,029	98	Concrete, HSG A
	34,554	78	Weighted Average
	11,772		34.07% Pervious Area
	22,782		65.93% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.11 cfs @ 12.14 hrs, Volume= 318 cf, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	1,965	39	>75% Grass cover, Good, HSG A
	2,158	98	Paved parking, HSG A
*	14	98	Concrete, HSG A
	4,137	70	Weighted Average
	1,965		47.50% Pervious Area
	2,172		52.50% Impervious Area

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

Summary for Subcatchment SUB-2C:

Runoff = 1.32 cfs @ 12.13 hrs, Volume= 3,872 cf, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	2,724	39	>75% Grass cover, Good, HSG A
	14,421	98	Paved parking, HSG A
	2,401	98	Roofs, HSG A
*	504	98	Concrete, HSG A
	20,050	90	Weighted Average
	2,724		13.59% Pervious Area
	17,326		86.41% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.03 cfs @ 12.14 hrs, Volume= 91 cf, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
504	39	>75% Grass cover, Good, HSG A
614	98	Roofs, HSG A
1,118	71	Weighted Average
504		45.08% Pervious Area
614		54.92% Impervious Area

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

Summary for Subcatchment SUB-4:

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
5,645	30	Woods, Good, HSG A
2,251	39	>75% Grass cover, Good, HSG A
7,896	33	Weighted Average
7,896		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	50	0.0160	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.5	81	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	131	Total			

Summary for Subcatchment SUB-5A:

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
25,865	30	Woods, Good, HSG A
14,441	39	>75% Grass cover, Good, HSG A
16	98	Paved parking, HSG A
40,322	33	Weighted Average
40,306		99.96% Pervious Area
16		0.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0360	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.7	105	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	71	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	351	Total			

Summary for Subcatchment SUB-5B:

Runoff = 0.30 cfs @ 12.14 hrs, Volume= 846 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
3,015	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
2,616	98	Roofs, HSG A
8,030	76	Weighted Average
3,015		37.55% Pervious Area
5,015		62.45% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 6,980 sf, 0.42% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 2 cf
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 2 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: (new Reach)

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

Inflow Area = 38,691 sf, 64.50% Impervious, Inflow Depth = 1.34" for 2-Year event
Inflow = 1.51 cfs @ 12.14 hrs, Volume= 4,326 cf
Outflow = 1.51 cfs @ 12.14 hrs, Volume= 4,326 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 1,118 sf, 54.92% Impervious, Inflow Depth = 0.98" for 2-Year event
Inflow = 0.03 cfs @ 12.14 hrs, Volume= 91 cf
Outflow = 0.03 cfs @ 12.14 hrs, Volume= 91 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 7,896 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: (new Reach)

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

Inflow Area = 48,352 sf, 10.40% Impervious, Inflow Depth = 0.21" for 2-Year event
Inflow = 0.30 cfs @ 12.14 hrs, Volume= 846 cf
Outflow = 0.30 cfs @ 12.14 hrs, Volume= 846 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=6,980 sf 0.42% Impervious Runoff Depth=0.23"
Flow Length=114' Tc=6.6 min CN=39 Runoff=0.01 cfs 133 cf

Subcatchment SUB-2A: Runoff Area=34,554 sf 65.93% Impervious Runoff Depth=2.83"
Tc=6.0 min CN=78 Runoff=2.86 cfs 8,152 cf

Subcatchment SUB-2B: Runoff Area=4,137 sf 52.50% Impervious Runoff Depth=2.14"
Tc=6.0 min CN=70 Runoff=0.26 cfs 738 cf

Subcatchment SUB-2C: Runoff Area=20,050 sf 86.41% Impervious Runoff Depth=4.01"
Tc=6.0 min CN=90 Runoff=2.22 cfs 6,702 cf

Subcatchment SUB-3: Runoff Area=1,118 sf 54.92% Impervious Runoff Depth=2.22"
Tc=6.0 min CN=71 Runoff=0.07 cfs 207 cf

Subcatchment SUB-4: Runoff Area=7,896 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=131' Tc=23.4 min CN=33 Runoff=0.00 cfs 36 cf

Subcatchment SUB-5A: Runoff Area=40,322 sf 0.04% Impervious Runoff Depth=0.05"
Flow Length=351' Tc=12.0 min CN=33 Runoff=0.01 cfs 183 cf

Subcatchment SUB-5B: Runoff Area=8,030 sf 62.45% Impervious Runoff Depth=2.65"
Tc=6.0 min CN=76 Runoff=0.62 cfs 1,774 cf

Reach DP-1: (new Reach) Inflow=0.01 cfs 133 cf
Outflow=0.01 cfs 133 cf

Reach DP-2: (new Reach) Inflow=3.12 cfs 8,890 cf
Outflow=3.12 cfs 8,890 cf

Reach DP-3: (new Reach) Inflow=0.07 cfs 207 cf
Outflow=0.07 cfs 207 cf

Reach DP-4: (new Reach) Inflow=0.00 cfs 36 cf
Outflow=0.00 cfs 36 cf

Reach DP-5: (new Reach) Inflow=0.62 cfs 1,957 cf
Outflow=0.62 cfs 1,957 cf

Total Runoff Area = 123,087 sf Runoff Volume = 17,926 cf Average Runoff Depth = 1.75"
61.04% Pervious = 75,133 sf 38.96% Impervious = 47,954 sf

Summary for Subcatchment SUB-1:

Runoff = 0.01 cfs @ 12.54 hrs, Volume= 133 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	6,951	39	>75% Grass cover, Good, HSG A
*	29	98	Concrete, HSG A
	6,980	39	Weighted Average
	6,951		99.58% Pervious Area
	29		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.36"
0.3	64	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.6	114	Total			

Summary for Subcatchment SUB-2A:

Runoff = 2.86 cfs @ 12.13 hrs, Volume= 8,152 cf, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	18,983	98	Paved parking, HSG A
	11,772	39	>75% Grass cover, Good, HSG A
	2,770	98	Roofs, HSG A
*	1,029	98	Concrete, HSG A
	34,554	78	Weighted Average
	11,772		34.07% Pervious Area
	22,782		65.93% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.26 cfs @ 12.13 hrs, Volume= 738 cf, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	1,965	39	>75% Grass cover, Good, HSG A
	2,158	98	Paved parking, HSG A
*	14	98	Concrete, HSG A
	4,137	70	Weighted Average
	1,965		47.50% Pervious Area
	2,172		52.50% Impervious Area

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

Summary for Subcatchment SUB-2C:

Runoff = 2.22 cfs @ 12.13 hrs, Volume= 6,702 cf, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	2,724	39	>75% Grass cover, Good, HSG A
	14,421	98	Paved parking, HSG A
	2,401	98	Roofs, HSG A
*	504	98	Concrete, HSG A
	20,050	90	Weighted Average
	2,724		13.59% Pervious Area
	17,326		86.41% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.07 cfs @ 12.13 hrs, Volume= 207 cf, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
504	39	>75% Grass cover, Good, HSG A
614	98	Roofs, HSG A
1,118	71	Weighted Average
504		45.08% Pervious Area
614		54.92% Impervious Area

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

Summary for Subcatchment SUB-4:

Runoff = 0.00 cfs @ 17.19 hrs, Volume= 36 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
5,645	30	Woods, Good, HSG A
2,251	39	>75% Grass cover, Good, HSG A
7,896	33	Weighted Average
7,896		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	50	0.0160	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.5	81	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	131	Total			

Summary for Subcatchment SUB-5A:

Runoff = 0.01 cfs @ 17.05 hrs, Volume= 183 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
25,865	30	Woods, Good, HSG A
14,441	39	>75% Grass cover, Good, HSG A
16	98	Paved parking, HSG A
40,322	33	Weighted Average
40,306		99.96% Pervious Area
16		0.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0360	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.7	105	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	71	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	351	Total			

Summary for Subcatchment SUB-5B:

Runoff = 0.62 cfs @ 12.13 hrs, Volume= 1,774 cf, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
3,015	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
2,616	98	Roofs, HSG A
8,030	76	Weighted Average
3,015		37.55% Pervious Area
5,015		62.45% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 6,980 sf, 0.42% Impervious, Inflow Depth = 0.23" for 10-Year event
Inflow = 0.01 cfs @ 12.54 hrs, Volume= 133 cf
Outflow = 0.01 cfs @ 12.54 hrs, Volume= 133 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: (new Reach)

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

Inflow Area = 38,691 sf, 64.50% Impervious, Inflow Depth = 2.76" for 10-Year event
Inflow = 3.12 cfs @ 12.13 hrs, Volume= 8,890 cf
Outflow = 3.12 cfs @ 12.13 hrs, Volume= 8,890 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 1,118 sf, 54.92% Impervious, Inflow Depth = 2.22" for 10-Year event
Inflow = 0.07 cfs @ 12.13 hrs, Volume= 207 cf
Outflow = 0.07 cfs @ 12.13 hrs, Volume= 207 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 7,896 sf, 0.00% Impervious, Inflow Depth = 0.05" for 10-Year event
Inflow = 0.00 cfs @ 17.19 hrs, Volume= 36 cf
Outflow = 0.00 cfs @ 17.19 hrs, Volume= 36 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: (new Reach)

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

Inflow Area = 48,352 sf, 10.40% Impervious, Inflow Depth = 0.49" for 10-Year event
Inflow = 0.62 cfs @ 12.13 hrs, Volume= 1,957 cf
Outflow = 0.62 cfs @ 12.13 hrs, Volume= 1,957 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=6,980 sf 0.42% Impervious Runoff Depth=0.52"
Flow Length=114' Tc=6.6 min CN=39 Runoff=0.04 cfs 302 cf

Subcatchment SUB-2A: Runoff Area=34,554 sf 65.93% Impervious Runoff Depth=3.80"
Tc=6.0 min CN=78 Runoff=3.81 cfs 10,944 cf

Subcatchment SUB-2B: Runoff Area=4,137 sf 52.50% Impervious Runoff Depth=3.00"
Tc=6.0 min CN=70 Runoff=0.37 cfs 1,036 cf

Subcatchment SUB-2C: Runoff Area=20,050 sf 86.41% Impervious Runoff Depth=5.09"
Tc=6.0 min CN=90 Runoff=2.77 cfs 8,504 cf

Subcatchment SUB-3: Runoff Area=1,118 sf 54.92% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=71 Runoff=0.10 cfs 289 cf

Subcatchment SUB-4: Runoff Area=7,896 sf 0.00% Impervious Runoff Depth=0.21"
Flow Length=131' Tc=23.4 min CN=33 Runoff=0.01 cfs 140 cf

Subcatchment SUB-5A: Runoff Area=40,322 sf 0.04% Impervious Runoff Depth=0.21"
Flow Length=351' Tc=12.0 min CN=33 Runoff=0.03 cfs 716 cf

Subcatchment SUB-5B: Runoff Area=8,030 sf 62.45% Impervious Runoff Depth=3.60"
Tc=6.0 min CN=76 Runoff=0.84 cfs 2,407 cf

Reach DP-1: (new Reach) Inflow=0.04 cfs 302 cf
Outflow=0.04 cfs 302 cf

Reach DP-2: (new Reach) Inflow=4.17 cfs 11,980 cf
Outflow=4.17 cfs 11,980 cf

Reach DP-3: (new Reach) Inflow=0.10 cfs 289 cf
Outflow=0.10 cfs 289 cf

Reach DP-4: (new Reach) Inflow=0.01 cfs 140 cf
Outflow=0.01 cfs 140 cf

Reach DP-5: (new Reach) Inflow=0.84 cfs 3,123 cf
Outflow=0.84 cfs 3,123 cf

Total Runoff Area = 123,087 sf Runoff Volume = 24,338 cf Average Runoff Depth = 2.37"
61.04% Pervious = 75,133 sf 38.96% Impervious = 47,954 sf

Summary for Subcatchment SUB-1:

Runoff = 0.04 cfs @ 12.21 hrs, Volume= 302 cf, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	6,951	39	>75% Grass cover, Good, HSG A
*	29	98	Concrete, HSG A
	6,980	39	Weighted Average
	6,951		99.58% Pervious Area
	29		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.36"
0.3	64	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.6	114	Total			

Summary for Subcatchment SUB-2A:

Runoff = 3.81 cfs @ 12.13 hrs, Volume= 10,944 cf, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	18,983	98	Paved parking, HSG A
	11,772	39	>75% Grass cover, Good, HSG A
	2,770	98	Roofs, HSG A
*	1,029	98	Concrete, HSG A
	34,554	78	Weighted Average
	11,772		34.07% Pervious Area
	22,782		65.93% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.37 cfs @ 12.13 hrs, Volume= 1,036 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	1,965	39	>75% Grass cover, Good, HSG A
	2,158	98	Paved parking, HSG A
*	14	98	Concrete, HSG A
	4,137	70	Weighted Average
	1,965		47.50% Pervious Area
	2,172		52.50% Impervious Area

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

Summary for Subcatchment SUB-2C:

Runoff = 2.77 cfs @ 12.13 hrs, Volume= 8,504 cf, Depth= 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	2,724	39	>75% Grass cover, Good, HSG A
	14,421	98	Paved parking, HSG A
	2,401	98	Roofs, HSG A
*	504	98	Concrete, HSG A
	20,050	90	Weighted Average
	2,724		13.59% Pervious Area
	17,326		86.41% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.10 cfs @ 12.13 hrs, Volume= 289 cf, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
504	39	>75% Grass cover, Good, HSG A
614	98	Roofs, HSG A
1,118	71	Weighted Average
504		45.08% Pervious Area
614		54.92% Impervious Area

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

Summary for Subcatchment SUB-4:

Runoff = 0.01 cfs @ 13.21 hrs, Volume= 140 cf, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
5,645	30	Woods, Good, HSG A
2,251	39	>75% Grass cover, Good, HSG A
7,896	33	Weighted Average
7,896		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	50	0.0160	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.5	81	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	131	Total			

Summary for Subcatchment SUB-5A:

Runoff = 0.03 cfs @ 13.02 hrs, Volume= 716 cf, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
25,865	30	Woods, Good, HSG A
14,441	39	>75% Grass cover, Good, HSG A
16	98	Paved parking, HSG A
40,322	33	Weighted Average
40,306		99.96% Pervious Area
16		0.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0360	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.7	105	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	71	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	351	Total			

Summary for Subcatchment SUB-5B:

Runoff = 0.84 cfs @ 12.13 hrs, Volume= 2,407 cf, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
3,015	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
2,616	98	Roofs, HSG A
8,030	76	Weighted Average
3,015		37.55% Pervious Area
5,015		62.45% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 6,980 sf, 0.42% Impervious, Inflow Depth = 0.52" for 25-Year event
Inflow = 0.04 cfs @ 12.21 hrs, Volume= 302 cf
Outflow = 0.04 cfs @ 12.21 hrs, Volume= 302 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: (new Reach)

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

Inflow Area = 38,691 sf, 64.50% Impervious, Inflow Depth = 3.72" for 25-Year event
Inflow = 4.17 cfs @ 12.13 hrs, Volume= 11,980 cf
Outflow = 4.17 cfs @ 12.13 hrs, Volume= 11,980 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 1,118 sf, 54.92% Impervious, Inflow Depth = 3.10" for 25-Year event
Inflow = 0.10 cfs @ 12.13 hrs, Volume= 289 cf
Outflow = 0.10 cfs @ 12.13 hrs, Volume= 289 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 7,896 sf, 0.00% Impervious, Inflow Depth = 0.21" for 25-Year event
Inflow = 0.01 cfs @ 13.21 hrs, Volume= 140 cf
Outflow = 0.01 cfs @ 13.21 hrs, Volume= 140 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: (new Reach)

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

Inflow Area = 48,352 sf, 10.40% Impervious, Inflow Depth = 0.78" for 25-Year event
Inflow = 0.84 cfs @ 12.13 hrs, Volume= 3,123 cf
Outflow = 0.84 cfs @ 12.13 hrs, Volume= 3,123 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=6,980 sf 0.42% Impervious Runoff Depth=1.14"
Flow Length=114' Tc=6.6 min CN=39 Runoff=0.17 cfs 666 cf

Subcatchment SUB-2A: Runoff Area=34,554 sf 65.93% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=78 Runoff=5.30 cfs 15,444 cf

Subcatchment SUB-2B: Runoff Area=4,137 sf 52.50% Impervious Runoff Depth=4.44"
Tc=6.0 min CN=70 Runoff=0.54 cfs 1,530 cf

Subcatchment SUB-2C: Runoff Area=20,050 sf 86.41% Impervious Runoff Depth=6.78"
Tc=6.0 min CN=90 Runoff=3.62 cfs 11,322 cf

Subcatchment SUB-3: Runoff Area=1,118 sf 54.92% Impervious Runoff Depth=4.55"
Tc=6.0 min CN=71 Runoff=0.15 cfs 424 cf

Subcatchment SUB-4: Runoff Area=7,896 sf 0.00% Impervious Runoff Depth=0.63"
Flow Length=131' Tc=23.4 min CN=33 Runoff=0.04 cfs 415 cf

Subcatchment SUB-5A: Runoff Area=40,322 sf 0.04% Impervious Runoff Depth=0.63"
Flow Length=351' Tc=12.0 min CN=33 Runoff=0.22 cfs 2,121 cf

Subcatchment SUB-5B: Runoff Area=8,030 sf 62.45% Impervious Runoff Depth=5.13"
Tc=6.0 min CN=76 Runoff=1.19 cfs 3,433 cf

Reach DP-1: (new Reach) Inflow=0.17 cfs 666 cf
Outflow=0.17 cfs 666 cf

Reach DP-2: (new Reach) Inflow=5.83 cfs 16,974 cf
Outflow=5.83 cfs 16,974 cf

Reach DP-3: (new Reach) Inflow=0.15 cfs 424 cf
Outflow=0.15 cfs 424 cf

Reach DP-4: (new Reach) Inflow=0.04 cfs 415 cf
Outflow=0.04 cfs 415 cf

Reach DP-5: (new Reach) Inflow=1.22 cfs 5,554 cf
Outflow=1.22 cfs 5,554 cf

Total Runoff Area = 123,087 sf Runoff Volume = 35,355 cf Average Runoff Depth = 3.45"
61.04% Pervious = 75,133 sf 38.96% Impervious = 47,954 sf

Summary for Subcatchment SUB-1:

Runoff = 0.17 cfs @ 12.16 hrs, Volume= 666 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	6,951	39	>75% Grass cover, Good, HSG A
*	29	98	Concrete, HSG A
	6,980	39	Weighted Average
	6,951		99.58% Pervious Area
	29		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.36"
0.3	64	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.6	114	Total			

Summary for Subcatchment SUB-2A:

Runoff = 5.30 cfs @ 12.13 hrs, Volume= 15,444 cf, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	18,983	98	Paved parking, HSG A
	11,772	39	>75% Grass cover, Good, HSG A
	2,770	98	Roofs, HSG A
*	1,029	98	Concrete, HSG A
	34,554	78	Weighted Average
	11,772		34.07% Pervious Area
	22,782		65.93% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.54 cfs @ 12.13 hrs, Volume= 1,530 cf, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	1,965	39	>75% Grass cover, Good, HSG A
	2,158	98	Paved parking, HSG A
*	14	98	Concrete, HSG A
	4,137	70	Weighted Average
	1,965		47.50% Pervious Area
	2,172		52.50% Impervious Area

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

Summary for Subcatchment SUB-2C:

Runoff = 3.62 cfs @ 12.13 hrs, Volume= 11,322 cf, Depth= 6.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	2,724	39	>75% Grass cover, Good, HSG A
	14,421	98	Paved parking, HSG A
	2,401	98	Roofs, HSG A
*	504	98	Concrete, HSG A
	20,050	90	Weighted Average
	2,724		13.59% Pervious Area
	17,326		86.41% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.15 cfs @ 12.13 hrs, Volume= 424 cf, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
504	39	>75% Grass cover, Good, HSG A
614	98	Roofs, HSG A
1,118	71	Weighted Average
504		45.08% Pervious Area
614		54.92% Impervious Area

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

Summary for Subcatchment SUB-4:

Runoff = 0.04 cfs @ 12.61 hrs, Volume= 415 cf, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
5,645	30	Woods, Good, HSG A
2,251	39	>75% Grass cover, Good, HSG A
7,896	33	Weighted Average
7,896		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	50	0.0160	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.5	81	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	131	Total			

Summary for Subcatchment SUB-5A:

Runoff = 0.22 cfs @ 12.36 hrs, Volume= 2,121 cf, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
25,865	30	Woods, Good, HSG A
14,441	39	>75% Grass cover, Good, HSG A
16	98	Paved parking, HSG A
40,322	33	Weighted Average
40,306		99.96% Pervious Area
16		0.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0360	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.7	105	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	71	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	351	Total			

Summary for Subcatchment SUB-5B:

Runoff = 1.19 cfs @ 12.13 hrs, Volume= 3,433 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
3,015	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
2,616	98	Roofs, HSG A
8,030	76	Weighted Average
3,015		37.55% Pervious Area
5,015		62.45% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 6,980 sf, 0.42% Impervious, Inflow Depth = 1.14" for 100-Year event
Inflow = 0.17 cfs @ 12.16 hrs, Volume= 666 cf
Outflow = 0.17 cfs @ 12.16 hrs, Volume= 666 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: (new Reach)

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

Inflow Area = 38,691 sf, 64.50% Impervious, Inflow Depth = 5.26" for 100-Year event
Inflow = 5.83 cfs @ 12.13 hrs, Volume= 16,974 cf
Outflow = 5.83 cfs @ 12.13 hrs, Volume= 16,974 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 1,118 sf, 54.92% Impervious, Inflow Depth = 4.55" for 100-Year event
Inflow = 0.15 cfs @ 12.13 hrs, Volume= 424 cf
Outflow = 0.15 cfs @ 12.13 hrs, Volume= 424 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 7,896 sf, 0.00% Impervious, Inflow Depth = 0.63" for 100-Year event
Inflow = 0.04 cfs @ 12.61 hrs, Volume= 415 cf
Outflow = 0.04 cfs @ 12.61 hrs, Volume= 415 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: (new Reach)

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

Inflow Area = 48,352 sf, 10.40% Impervious, Inflow Depth = 1.38" for 100-Year event
Inflow = 1.22 cfs @ 12.14 hrs, Volume= 5,554 cf
Outflow = 1.22 cfs @ 12.14 hrs, Volume= 5,554 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

SOIL TEST DATA

SOIL TESTING AND EVALUATION BY: DAVID NEWHALL S.E. #14226
SOIL TESTING WITNESSED BY: UNWITNESSED
DATE: NOVEMBER 24, 2020

TP-1 — APPROX. GRADE EL. 189.5

EL. 188.2	A HORIZON LOAMY SAND 10YR 3/2	16"
EL. 186.8	B HORIZON LOAMY SAND 10YR 5/6	32"
EL. 185.2	B/C HORIZON LOAMY SAND 10YR 4/4	52"
EL. 176.5	C1 HORIZON SAND 2.5Y 6/2	156"

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >156"

TP-2 — APPROX. GRADE EL. 189.6

EL. 188.3	A HORIZON LOAMY SAND 10YR 3/2	16"
EL. 187.1	B HORIZON LOAMY SAND 10YR 5/8	30"
EL. 183.6	B/C HORIZON LOAMY SAND 10YR 4/4	72"
EL. 176.1	C1 HORIZON SAND 2.5Y 6/2	162"

MOTTLING OBSERVED: 120" (EL. 179.6)
WEEPING OBSERVED: NONE
E.S.H.G.W.: 120" (EL. 179.6)

TP-3 — APPROX. GRADE EL. 189.0

EL. 185.3	FILL	44"
EL. 177.0	C1 HORIZON SAND 2.5Y 6/2	144"

MOTTLING OBSERVED: 132" (EL. 178.0)
WEEPING OBSERVED: NONE
E.S.H.G.W.: 132" (EL. 178.0)

TP-4 — APPROX. GRADE EL. 186.5

EL. 182.5	FILL	48"
EL. 174.0	C1 HORIZON SAND 2.5Y 6/2	150"

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >150"

TP-5 — APPROX. GRADE EL. 186.2

EL. 188.3	A HORIZON LOAMY SAND 10YR 3/2	12"
EL. 187.1	B HORIZON LOAMY SAND 10YR 5/6	24"
EL. 183.6	C1 HORIZON SAND 2.5Y 5/3	150"

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >150"

TP-6 — APPROX. GRADE EL. 174.5

EL. 173.5	A HORIZON LOAMY SAND 10YR 3/2	12"
EL. 172.5	B HORIZON LOAMY SAND 10YR 5/8	24"
EL. 169.0	C HORIZON LOAMY SAND 10YR 4/4	66"
EL. 164.5	C2 HORIZON SAND 2.5Y 5/3	120"

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >120"

TP-7 — APPROX. GRADE EL. 176.4

EL. 173.5	A HORIZON LOAMY SAND 10YR 3/2	12"
EL. 172.5	B HORIZON LOAMY SAND 10YR 5/8	24"
EL. 169.0	C HORIZON LOAMY SAND 10YR 4/4	66"
EL. 166.4	C2 HORIZON SAND 2.5Y 5/3	120"

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >120"

SOIL TEST DATA

SOIL TESTING AND EVALUATION BY: TAYLOR CORSANO S.E. #14263
SOIL TESTING WITNESSED BY: UNWITNESSED
DATE: AUGUST 22, 2022

TP-100 — APPROX. GRADE EL. 190.0

EL. 189.0	A/B HORIZON LOAM 7.5YR 2.5/2	12"
EL. 186.0	C1 HORIZON LOAMY SAND 7.5YR 5/4	48"
EL. 180.0	C2 HORIZON SAND W/ FINES 7.5YR 8/4	120"

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >120"

MAP UNIT SYMBOL	MAP UNIT NAME	HYDROLOGIC RATING
623C	WOODBRIDGE-URBAN LAND COMPLEX, 3-15% SLOPES	D
628C	CANTON-URBAN LAND COMPLEX, 3-15% SLOPES	A
602	URBAN LAND, 0-15% SLOPES	UNRANKED

SF=SHEET FLOW
SCF= SHALLOW CONCENTRATED FLOW

POINT OF DISCHARGE 5
PEAK DISCHARGE SUMMARY
2-YEAR STORM = 0.30 cfs
10-YEAR STORM = 0.62 cfs
25-YEAR STORM = 0.84 cfs
100-YEAR STORM = 1.22 cfs

POINT OF DISCHARGE 3
PEAK DISCHARGE SUMMARY
2-YEAR STORM = 0.03 cfs
10-YEAR STORM = 0.07 cfs
25-YEAR STORM = 0.10 cfs
100-YEAR STORM = 0.15 cfs

POINT OF DISCHARGE 1
PEAK DISCHARGE SUMMARY
2-YEAR STORM = 0.00 cfs
10-YEAR STORM = 0.01 cfs
25-YEAR STORM = 0.04 cfs
100-YEAR STORM = 0.17 cfs

POINT OF DISCHARGE 2
PEAK DISCHARGE SUMMARY
2-YEAR STORM = 1.51 cfs
10-YEAR STORM = 3.12 cfs
25-YEAR STORM = 4.17 cfs
100-YEAR STORM = 5.83 cfs

POINT OF DISCHARGE 4
PEAK DISCHARGE SUMMARY
2-YEAR STORM = 0.00 cfs
10-YEAR STORM = 0.00 cfs
25-YEAR STORM = 0.01 cfs
100-YEAR STORM = 0.04 cfs

SUB-1
AREA=6,980 S.F.
CN=39
Tc=6.6 MIN.

SUB-2A
AREA=34,554 S.F.
CN=78
Tc=6.0 MIN.

SUB-2B
AREA=4,137 S.F.
CN=70
Tc=6.0 MIN.

SUB-2C
AREA=20,050 S.F.
CN=90
Tc=6.0 MIN.

SUB-3
AREA=1,118 S.F.
CN=71
Tc=6.0 MIN.

SUB-4
AREA=7,896 S.F.
CN=33
Tc=23.4 MIN.

SUB-5A
AREA=40,322 S.F.
CN=33
Tc=12.0 MIN.

SUB-5B
AREA=8,030 S.F.
CN=76
Tc=6.0 MIN.

CYPRESS STREET

COLUMBIAN STREET
PUBLIC - VARIABLE WIDTH

MAIN STREET ROUTE 18
2006 ALTERATION - LAYOUT No. 7943

SCALE: 1" = 30'
30 0 15 30 60

Date	Description	No.
10-12-22	ZBA HEARING COMMENTS	3
8-24-22	ZBA HEARING COMMENTS	2
4-8-22	ADDRESS ENGINEERING COMMENTS	1

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

10-12-2022
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

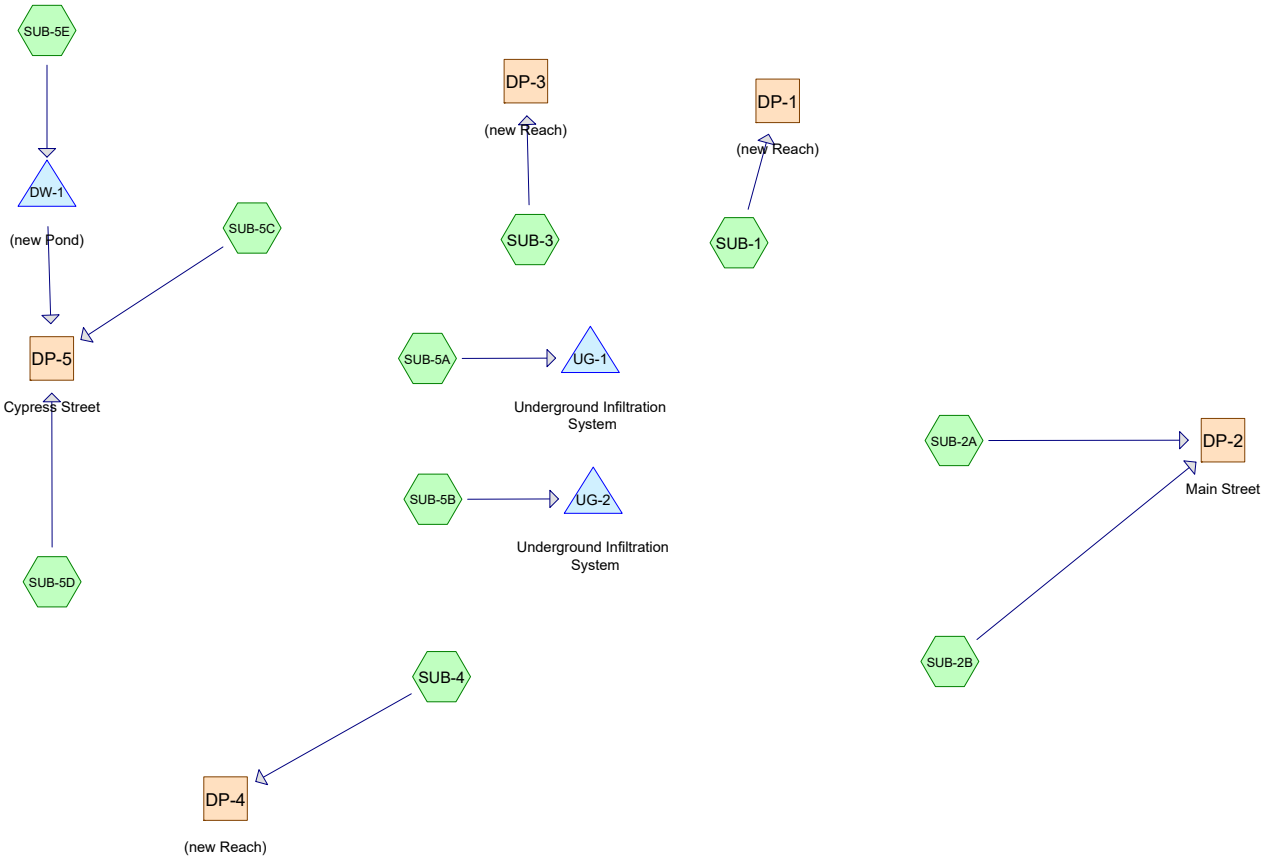
Project
MCDONALD-KEOHANE FUNERAL HOME - SOUTH
809 MAIN STREET
WEYMOUTH, MA 02190

Prepared for
MCDONALD KEOHANE FUNERAL HOME, INC.
785 HANCOCK STREET
QUINCY, MA 02170

Drawing Title
PRE-CONSTRUCTION WATERSHED PLAN

Project No.	100-060
Date	02 / 04 / 2022
Scale	SEE PLAN
Drawn By	CM / JM
Approved By	GRC

Drawing No.
WS-1



Subcat Reach Pond Link

Routing Diagram for Proposed
Prepared by HP Inc., Printed 10/11/2022
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
40,766	39	>75% Grass cover, Good, HSG A (SUB-1, SUB-2A, SUB-2B, SUB-3, SUB-4, SUB-5A, SUB-5B, SUB-5C, SUB-5D)
3,122	98	Concrete, HSG A (SUB-1, SUB-2A, SUB-3, SUB-5A, SUB-5B)
47,420	98	Paved parking, HSG A (SUB-2A, SUB-2B, SUB-5A, SUB-5B, SUB-5D)
13,553	98	Roofs, HSG A (SUB-2A, SUB-5A, SUB-5B, SUB-5D, SUB-5E)
16,380	30	Woods, Good, HSG A (SUB-4, SUB-5C)
1,846	32	Woods/grass comb., Good, HSG A (SUB-5C)
123,087	**68**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
123,087	HSG A	SUB-1, SUB-2A, SUB-2B, SUB-3, SUB-4, SUB-5A, SUB-5B, SUB-5C, SUB-5D, SUB-5E
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
123,087		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
40,766	0	0	0	0	40,766	>75% Grass cover, Good	
3,122	0	0	0	0	3,122	Concrete	
47,420	0	0	0	0	47,420	Paved parking	
13,553	0	0	0	0	13,553	Roofs	
16,380	0	0	0	0	16,380	Woods, Good	
1,846	0	0	0	0	1,846	Woods/grass comb., Good	
123,087	**0**	**0**	**0**	**0**	**123,087**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=2,901 sf 2.07% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=40 Runoff=0.00 cfs 2 cf

Subcatchment SUB-2A: Runoff Area=27,006 sf 60.64% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=75 Runoff=0.94 cfs 2,709 cf

Subcatchment SUB-2B: Runoff Area=5,512 sf 54.35% Impervious Runoff Depth=0.98"
Tc=6.0 min CN=71 Runoff=0.15 cfs 448 cf

Subcatchment SUB-3: Runoff Area=851 sf 15.28% Impervious Runoff Depth=0.12"
Tc=6.0 min CN=48 Runoff=0.00 cfs 8 cf

Subcatchment SUB-4: Runoff Area=4,965 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=84' Tc=8.7 min CN=34 Runoff=0.00 cfs 0 cf

Subcatchment SUB-5A: Runoff Area=18,262 sf 96.27% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=96 Runoff=1.40 cfs 4,424 cf

Subcatchment SUB-5B: Runoff Area=25,632 sf 85.58% Impervious Runoff Depth=2.23"
Tc=6.0 min CN=89 Runoff=1.64 cfs 4,759 cf

Subcatchment SUB-5C: Runoff Area=29,927 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=245' Tc=10.3 min CN=34 Runoff=0.00 cfs 0 cf

Subcatchment SUB-5D: Runoff Area=7,234 sf 58.31% Impervious Runoff Depth=1.09"
Tc=6.0 min CN=73 Runoff=0.23 cfs 655 cf

Subcatchment SUB-5E: Runoff Area=797 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=0.06 cfs 208 cf

Reach DP-1: (new Reach) Inflow=0.00 cfs 2 cf
Outflow=0.00 cfs 2 cf

Reach DP-2: Main Street Inflow=1.09 cfs 3,157 cf
Outflow=1.09 cfs 3,157 cf

Reach DP-3: (new Reach) Inflow=0.00 cfs 8 cf
Outflow=0.00 cfs 8 cf

Reach DP-4: (new Reach) Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach DP-5: Cypress Street Inflow=0.23 cfs 655 cf
Outflow=0.23 cfs 655 cf

Pond DW-1: (new Pond) Peak Elev=170.85' Storage=85 cf Inflow=0.06 cfs 208 cf
Discarded=0.00 cfs 208 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 208 cf

Pond UG-1: Underground Infiltration System Peak Elev=182.35' Storage=1,785 cf Inflow=1.40 cfs 4,424 cf
Outflow=0.11 cfs 4,424 cf

Pond UG-2: Underground Infiltration System Peak Elev=182.48' Storage=1,888 cf Inflow=1.64 cfs 4,759 cf
Outflow=0.14 cfs 4,759 cf

Total Runoff Area = 123,087 sf Runoff Volume = 13,213 cf Average Runoff Depth = 1.29"
47.93% Pervious = 58,992 sf 52.07% Impervious = 64,095 sf

Summary for Subcatchment SUB-1:

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 2 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	2,841	39	>75% Grass cover, Good, HSG A
*	60	98	Concrete, HSG A
	2,901	40	Weighted Average
	2,841		97.93% Pervious Area
	60		2.07% Impervious Area

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

Summary for Subcatchment SUB-2A:

Runoff = 0.94 cfs @ 12.14 hrs, Volume= 2,709 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	13,047	98	Paved parking, HSG A
*	1,721	98	Concrete, HSG A
	1,608	98	Roofs, HSG A
	10,630	39	>75% Grass cover, Good, HSG A
	27,006	75	Weighted Average
	10,630		39.36% Pervious Area
	16,376		60.64% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.15 cfs @ 12.14 hrs, Volume= 448 cf, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
2,996	98	Paved parking, HSG A
2,516	39	>75% Grass cover, Good, HSG A
5,512	71	Weighted Average
2,516		45.65% Pervious Area
2,996		54.35% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.00 cfs @ 12.93 hrs, Volume= 8 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	721	39	>75% Grass cover, Good, HSG A
*	130	98	Concrete, HSG A
	851	48	Weighted Average
	721		84.72% Pervious Area
	130		15.28% Impervious Area

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

Summary for Subcatchment SUB-4:

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
2,157	39	>75% Grass cover, Good, HSG A
2,808	30	Woods, Good, HSG A
4,965	34	Weighted Average
4,965		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	34	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	84	Total			

Summary for Subcatchment SUB-5A:

Runoff = 1.40 cfs @ 12.13 hrs, Volume= 4,424 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	12,756	98	Paved parking, HSG A
	681	39	>75% Grass cover, Good, HSG A
	4,649	98	Roofs, HSG A
*	176	98	Concrete, HSG A
	18,262	96	Weighted Average
	681		3.73% Pervious Area
	17,581		96.27% Impervious Area

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

Summary for Subcatchment SUB-5B:

Runoff = 1.64 cfs @ 12.13 hrs, Volume= 4,759 cf, Depth= 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

	Area (sf)	CN	Description
	16,222	98	Paved parking, HSG A
	3,695	39	>75% Grass cover, Good, HSG A
*	1,035	98	Concrete, HSG A
	4,680	98	Roofs, HSG A
	25,632	89	Weighted Average
	3,695		14.42% Pervious Area
	21,937		85.58% Impervious Area

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

Summary for Subcatchment SUB-5C:

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
14,509	39	>75% Grass cover, Good, HSG A
13,572	30	Woods, Good, HSG A
1,846	32	Woods/grass comb., Good, HSG A
29,927	34	Weighted Average
29,927		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	70	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.3	245	Total			

Summary for Subcatchment SUB-5D:

Runoff = 0.23 cfs @ 12.14 hrs, Volume= 655 cf, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
3,016	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
1,819	98	Roofs, HSG A
7,234	73	Weighted Average
3,016		41.69% Pervious Area
4,218		58.31% Impervious Area

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

Summary for Subcatchment SUB-5E:

Runoff = 0.06 cfs @ 12.13 hrs, Volume= 208 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
797	98	Roofs, HSG A
797		100.00% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 2,901 sf, 2.07% Impervious, Inflow Depth = 0.01" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 2 cf
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 2 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Main Street

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

Inflow Area = 32,518 sf, 59.57% Impervious, Inflow Depth = 1.17" for 2-Year event
Inflow = 1.09 cfs @ 12.14 hrs, Volume= 3,157 cf
Outflow = 1.09 cfs @ 12.14 hrs, Volume= 3,157 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 851 sf, 15.28% Impervious, Inflow Depth = 0.12" for 2-Year event
Inflow = 0.00 cfs @ 12.93 hrs, Volume= 8 cf
Outflow = 0.00 cfs @ 12.93 hrs, Volume= 8 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 4,965 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: Cypress Street

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

Inflow Area = 37,958 sf, 13.21% Impervious, Inflow Depth = 0.21" for 2-Year event
Inflow = 0.23 cfs @ 12.14 hrs, Volume= 655 cf
Outflow = 0.23 cfs @ 12.14 hrs, Volume= 655 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond DW-1: (new Pond)

Inflow Area = 797 sf,100.00% Impervious, Inflow Depth = 3.13" for 2-Year event
Inflow = 0.06 cfs @ 12.13 hrs, Volume= 208 cf
Outflow = 0.00 cfs @ 11.10 hrs, Volume= 208 cf, Atten= 93%, Lag= 0.0 min
Discarded = 0.00 cfs @ 11.10 hrs, Volume= 208 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 170.85' @ 13.29 hrs Surf.Area= 79 sf Storage= 85 cf

Plug-Flow detention time= 144.2 min calculated for 207 cf (100% of inflow)
Center-of-Mass det. time= 144.0 min (900.5 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1	168.60'	90 cf	**10.00'D x 5.00'H Vertical Cone/Cylinder** 393 cf Overall - 169 cf Embedded = 224 cf x 40.0% Voids
#2	169.60'	113 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** Inside #1 169 cf Overall - 8.0" Wall Thickness = 113 cf
#3	173.60'	486 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		689 cf	Total Available Storage

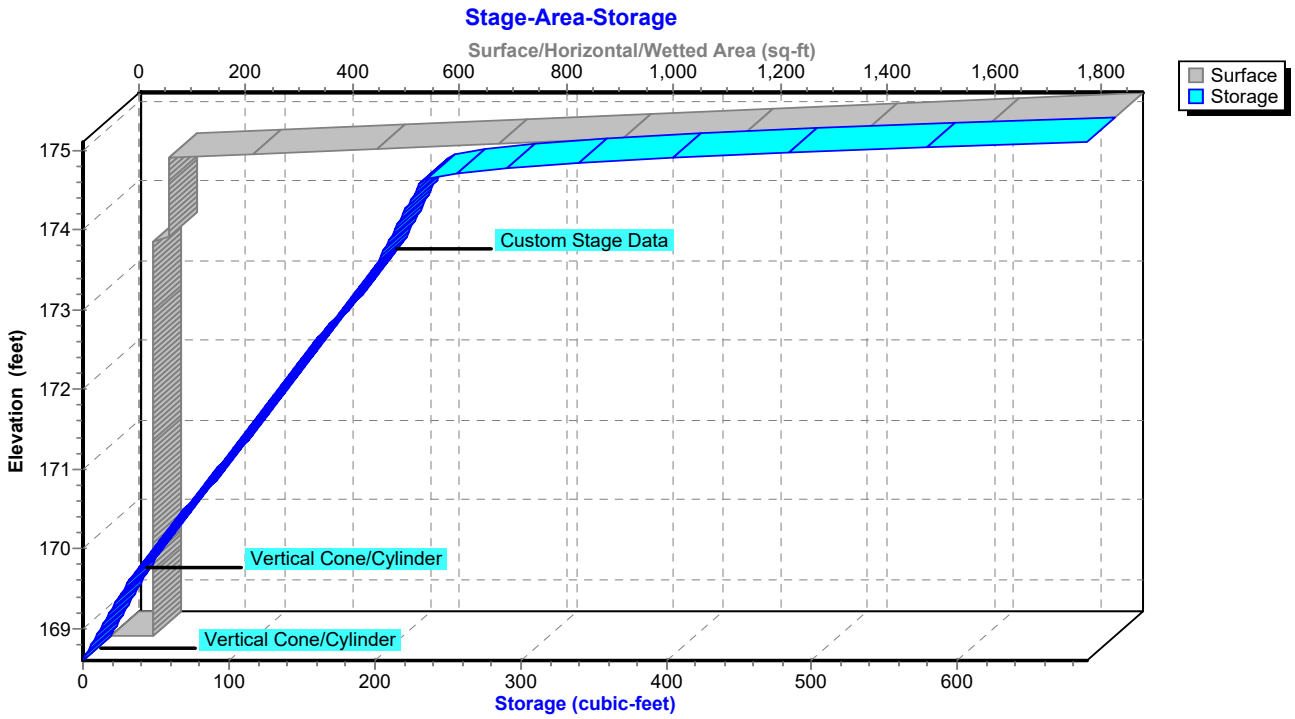
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.60	29	0	0
174.60	29	29	29
175.10	1,800	457	486

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.60'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.60'	**1.5" x 1.5" Horiz. Orifice/Grate** X 10 rows C= 0.600 in 24.0" x 24.0" Grate (4% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.10 hrs HW=168.67' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.60' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DW-1: (new Pond)



Summary for Pond UG-1: Underground Infiltration System

Inflow Area = 18,262 sf, 96.27% Impervious, Inflow Depth = 2.91" for 2-Year event
Inflow = 1.40 cfs @ 12.13 hrs, Volume= 4,424 cf
Outflow = 0.11 cfs @ 11.25 hrs, Volume= 4,424 cf, Atten= 92%, Lag= 0.0 min
Discarded = 0.11 cfs @ 11.25 hrs, Volume= 4,424 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 182.35' @ 13.19 hrs Surf.Area= 1,924 sf Storage= 1,785 cf

Plug-Flow detention time= 124.9 min calculated for 4,419 cf (100% of inflow)
Center-of-Mass det. time= 124.7 min (899.2 - 774.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	180.84'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	181.59'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	180.84'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.11 cfs @ 11.25 hrs HW=180.90' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Pond UG-1: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

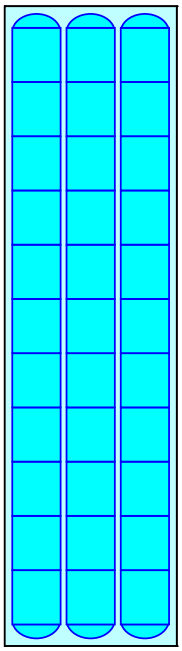
11 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 82.57' Row Length +12.0" End Stone x 2 = 84.57' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

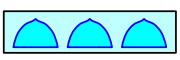
33 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 3,717.8 cf Chamber Storage

10,581.8 cf Field - 3,717.8 cf Chambers = 6,864.0 cf Stone x 40.0% Voids = 2,745.6 cf Stone Storage

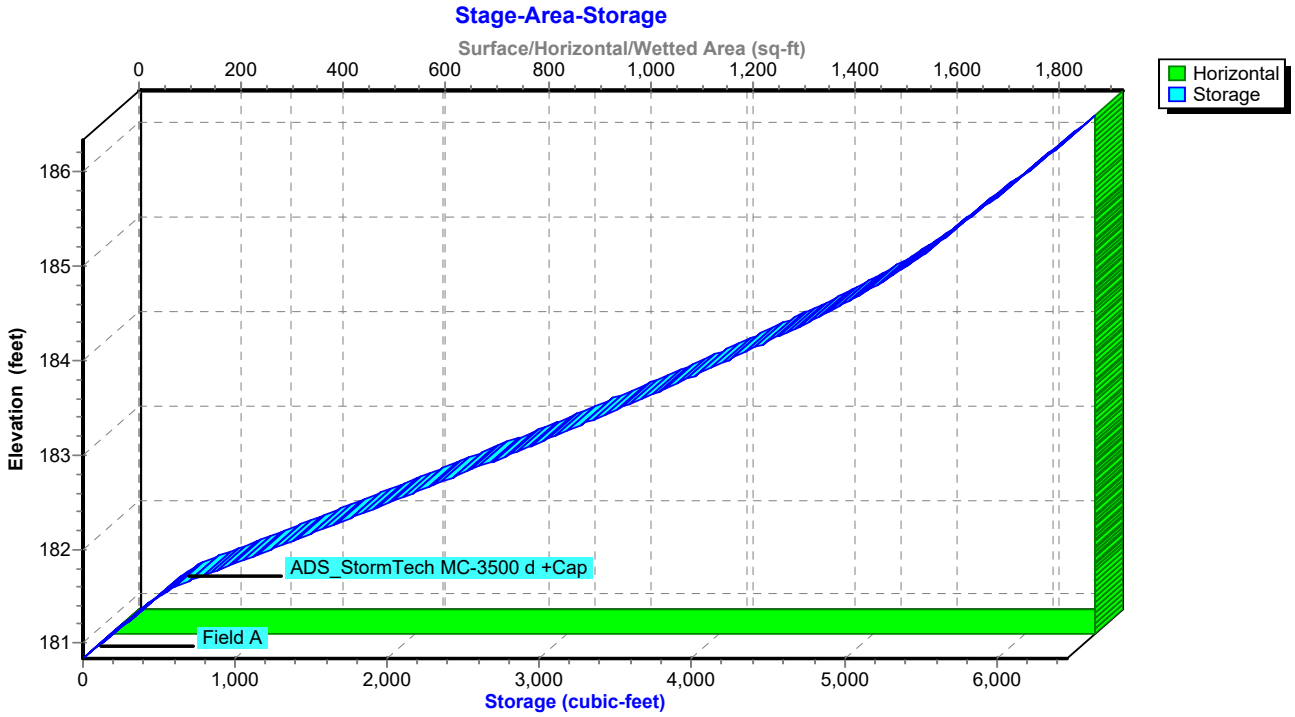
Chamber Storage + Stone Storage = 6,463.4 cf = 0.148 af
Overall Storage Efficiency = 61.1%
Overall System Size = 84.57' x 22.75' x 5.50'

33 Chambers
391.9 cy Field
254.2 cy Stone





Pond UG-1: Underground Infiltration System



Summary for Pond UG-2: Underground Infiltration System

Inflow Area = 25,632 sf, 85.58% Impervious, Inflow Depth = 2.23" for 2-Year event
Inflow = 1.64 cfs @ 12.13 hrs, Volume= 4,759 cf
Outflow = 0.14 cfs @ 11.55 hrs, Volume= 4,759 cf, Atten= 91%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.55 hrs, Volume= 4,759 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 182.48' @ 13.12 hrs Surf.Area= 2,576 sf Storage= 1,888 cf

Plug-Flow detention time= 103.7 min calculated for 4,754 cf (100% of inflow)
Center-of-Mass det. time= 103.6 min (915.8 - 812.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.22'	3,653 cf	**22.75'W x 113.25'L x 5.50'H Field A** 14,170 cf Overall - 5,037 cf Embedded = 9,133 cf x 40.0% Voids
#2A	181.97'	5,037 cf	**ADS_StormTech MC-3500 d +Cap** x 45 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 45 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		8,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.22'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 11.55 hrs HW=181.28' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond UG-2: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

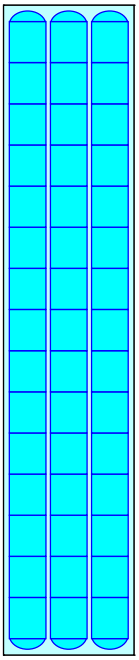
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +12.0" End Stone x 2 = 113.25' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

45 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 5,037.2 cf Chamber Storage

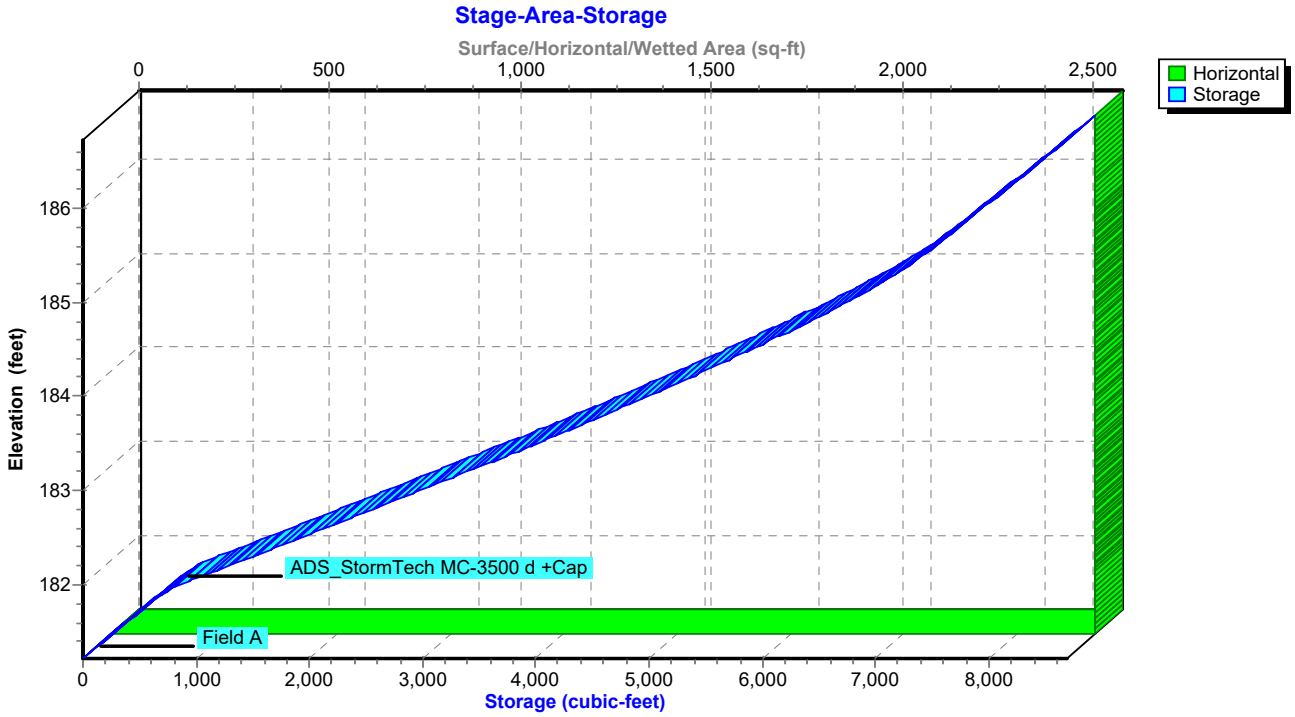
14,170.4 cf Field - 5,037.2 cf Chambers = 9,133.2 cf Stone x 40.0% Voids = 3,653.3 cf Stone Storage

Chamber Storage + Stone Storage = 8,690.5 cf = 0.200 af
Overall Storage Efficiency = 61.3%
Overall System Size = 113.25' x 22.75' x 5.50'

45 Chambers
524.8 cy Field
338.3 cy Stone



Pond UG-2: Underground Infiltration System



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=2,901 sf 2.07% Impervious Runoff Depth=0.27"
Tc=6.0 min CN=40 Runoff=0.00 cfs 65 cf

Subcatchment SUB-2A: Runoff Area=27,006 sf 60.64% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=75 Runoff=2.03 cfs 5,769 cf

Subcatchment SUB-2B: Runoff Area=5,512 sf 54.35% Impervious Runoff Depth=2.22"
Tc=6.0 min CN=71 Runoff=0.36 cfs 1,021 cf

Subcatchment SUB-3: Runoff Area=851 sf 15.28% Impervious Runoff Depth=0.64"
Tc=6.0 min CN=48 Runoff=0.01 cfs 45 cf

Subcatchment SUB-4: Runoff Area=4,965 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=84' Tc=8.7 min CN=34 Runoff=0.00 cfs 32 cf

Subcatchment SUB-5A: Runoff Area=18,262 sf 96.27% Impervious Runoff Depth=4.67"
Tc=6.0 min CN=96 Runoff=2.19 cfs 7,110 cf

Subcatchment SUB-5B: Runoff Area=25,632 sf 85.58% Impervious Runoff Depth=3.91"
Tc=6.0 min CN=89 Runoff=2.78 cfs 8,343 cf

Subcatchment SUB-5C: Runoff Area=29,927 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=245' Tc=10.3 min CN=34 Runoff=0.01 cfs 191 cf

Subcatchment SUB-5D: Runoff Area=7,234 sf 58.31% Impervious Runoff Depth=2.39"
Tc=6.0 min CN=73 Runoff=0.51 cfs 1,441 cf

Subcatchment SUB-5E: Runoff Area=797 sf 100.00% Impervious Runoff Depth=4.90"
Tc=6.0 min CN=98 Runoff=0.10 cfs 326 cf

Reach DP-1: (new Reach) Inflow=0.00 cfs 65 cf
Outflow=0.00 cfs 65 cf

Reach DP-2: Main Street Inflow=2.39 cfs 6,790 cf
Outflow=2.39 cfs 6,790 cf

Reach DP-3: (new Reach) Inflow=0.01 cfs 45 cf
Outflow=0.01 cfs 45 cf

Reach DP-4: (new Reach) Inflow=0.00 cfs 32 cf
Outflow=0.00 cfs 32 cf

Reach DP-5: Cypress Street Inflow=0.51 cfs 1,632 cf
Outflow=0.51 cfs 1,632 cf

Pond DW-1: (new Pond) Peak Elev=172.47' Storage=154 cf Inflow=0.10 cfs 326 cf
Discarded=0.00 cfs 326 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 326 cf

Pond UG-1: Underground Infiltration System Peak Elev=183.37' Storage=3,349 cf Inflow=2.19 cfs 7,110 cf
Outflow=0.11 cfs 7,110 cf

Pond UG-2: Underground Infiltration System Peak Elev=183.51' Storage=4,027 cf Inflow=2.78 cfs 8,343 cf
Outflow=0.14 cfs 8,343 cf

Total Runoff Area = 123,087 sf Runoff Volume = 24,342 cf Average Runoff Depth = 2.37"
47.93% Pervious = 58,992 sf 52.07% Impervious = 64,095 sf

Summary for Subcatchment SUB-1:

Runoff = 0.00 cfs @ 12.53 hrs, Volume= 65 cf, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	2,841	39	>75% Grass cover, Good, HSG A
*	60	98	Concrete, HSG A
	2,901	40	Weighted Average
	2,841		97.93% Pervious Area
	60		2.07% Impervious Area

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

Summary for Subcatchment SUB-2A:

Runoff = 2.03 cfs @ 12.13 hrs, Volume= 5,769 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	13,047	98	Paved parking, HSG A
*	1,721	98	Concrete, HSG A
	1,608	98	Roofs, HSG A
	10,630	39	>75% Grass cover, Good, HSG A
	27,006	75	Weighted Average
	10,630		39.36% Pervious Area
	16,376		60.64% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.36 cfs @ 12.13 hrs, Volume= 1,021 cf, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
2,996	98	Paved parking, HSG A
2,516	39	>75% Grass cover, Good, HSG A
5,512	71	Weighted Average
2,516		45.65% Pervious Area
2,996		54.35% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.01 cfs @ 12.16 hrs, Volume= 45 cf, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	721	39	>75% Grass cover, Good, HSG A
*	130	98	Concrete, HSG A
	851	48	Weighted Average
	721		84.72% Pervious Area
	130		15.28% Impervious Area

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

Summary for Subcatchment SUB-4:

Runoff = 0.00 cfs @ 16.25 hrs, Volume= 32 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
2,157	39	>75% Grass cover, Good, HSG A
2,808	30	Woods, Good, HSG A
4,965	34	Weighted Average
4,965		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	34	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	84	Total			

Summary for Subcatchment SUB-5A:

Runoff = 2.19 cfs @ 12.13 hrs, Volume= 7,110 cf, Depth= 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	12,756	98	Paved parking, HSG A
	681	39	>75% Grass cover, Good, HSG A
	4,649	98	Roofs, HSG A
*	176	98	Concrete, HSG A
	18,262	96	Weighted Average
	681		3.73% Pervious Area
	17,581		96.27% Impervious Area

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

Summary for Subcatchment SUB-5B:

Runoff = 2.78 cfs @ 12.13 hrs, Volume= 8,343 cf, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	16,222	98	Paved parking, HSG A
	3,695	39	>75% Grass cover, Good, HSG A
*	1,035	98	Concrete, HSG A
	4,680	98	Roofs, HSG A
	25,632	89	Weighted Average
	3,695		14.42% Pervious Area
	21,937		85.58% Impervious Area

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

Summary for Subcatchment SUB-5C:

Runoff = 0.01 cfs @ 16.27 hrs, Volume= 191 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
14,509	39	>75% Grass cover, Good, HSG A
13,572	30	Woods, Good, HSG A
1,846	32	Woods/grass comb., Good, HSG A
29,927	34	Weighted Average
29,927		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	70	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.3	245	Total			

Summary for Subcatchment SUB-5D:

Runoff = 0.51 cfs @ 12.13 hrs, Volume= 1,441 cf, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
3,016	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
1,819	98	Roofs, HSG A
7,234	73	Weighted Average
3,016		41.69% Pervious Area
4,218		58.31% Impervious Area

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

Summary for Subcatchment SUB-5E:

Runoff = 0.10 cfs @ 12.13 hrs, Volume= 326 cf, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.14"

Area (sf)	CN	Description
797	98	Roofs, HSG A
797		100.00% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 2,901 sf, 2.07% Impervious, Inflow Depth = 0.27" for 10-Year event
Inflow = 0.00 cfs @ 12.53 hrs, Volume= 65 cf
Outflow = 0.00 cfs @ 12.53 hrs, Volume= 65 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Main Street

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

Inflow Area = 32,518 sf, 59.57% Impervious, Inflow Depth = 2.51" for 10-Year event
Inflow = 2.39 cfs @ 12.13 hrs, Volume= 6,790 cf
Outflow = 2.39 cfs @ 12.13 hrs, Volume= 6,790 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 851 sf, 15.28% Impervious, Inflow Depth = 0.64" for 10-Year event
Inflow = 0.01 cfs @ 12.16 hrs, Volume= 45 cf
Outflow = 0.01 cfs @ 12.16 hrs, Volume= 45 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 4,965 sf, 0.00% Impervious, Inflow Depth = 0.08" for 10-Year event
Inflow = 0.00 cfs @ 16.25 hrs, Volume= 32 cf
Outflow = 0.00 cfs @ 16.25 hrs, Volume= 32 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: Cypress Street

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

Inflow Area = 37,958 sf, 13.21% Impervious, Inflow Depth = 0.52" for 10-Year event
Inflow = 0.51 cfs @ 12.13 hrs, Volume= 1,632 cf
Outflow = 0.51 cfs @ 12.13 hrs, Volume= 1,632 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond DW-1: (new Pond)

Inflow Area = 797 sf,100.00% Impervious, Inflow Depth = 4.90" for 10-Year event
Inflow = 0.10 cfs @ 12.13 hrs, Volume= 326 cf
Outflow = 0.00 cfs @ 10.50 hrs, Volume= 326 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.00 cfs @ 10.50 hrs, Volume= 326 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 172.47' @ 13.93 hrs Surf.Area= 79 sf Storage= 154 cf

Plug-Flow detention time= 286.7 min calculated for 325 cf (100% of inflow)
Center-of-Mass det. time= 286.7 min (1,035.0 - 748.4)

Volume	Invert	Avail.Storage	Storage Description
#1	168.60'	90 cf	**10.00'D x 5.00'H Vertical Cone/Cylinder** 393 cf Overall - 169 cf Embedded = 224 cf x 40.0% Voids
#2	169.60'	113 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** Inside #1 169 cf Overall - 8.0" Wall Thickness = 113 cf
#3	173.60'	486 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		689 cf	Total Available Storage

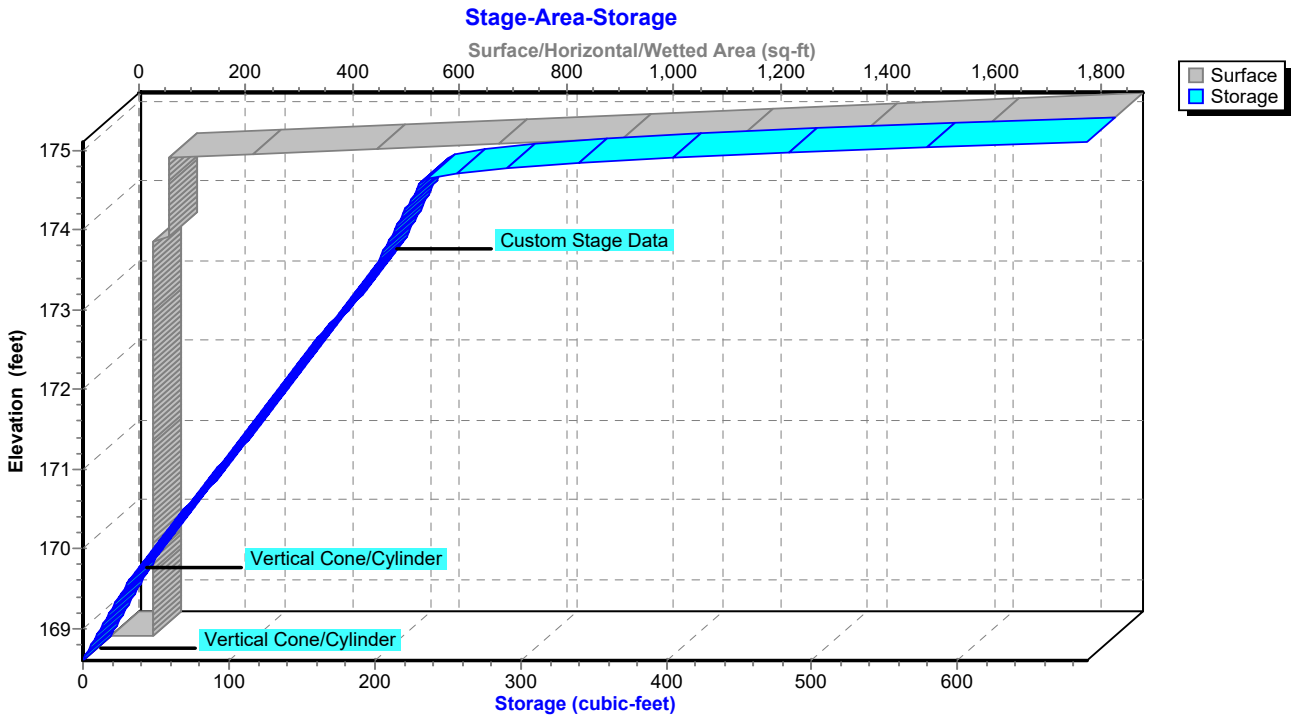
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.60	29	0	0
174.60	29	29	29
175.10	1,800	457	486

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.60'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.60'	**1.5" x 1.5" Horiz. Orifice/Grate** X 10 rows C= 0.600 in 24.0" x 24.0" Grate (4% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 10.50 hrs HW=168.67' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.60' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DW-1: (new Pond)



Summary for Pond UG-1: Underground Infiltration System

Inflow Area = 18,262 sf, 96.27% Impervious, Inflow Depth = 4.67" for 10-Year event
Inflow = 2.19 cfs @ 12.13 hrs, Volume= 7,110 cf
Outflow = 0.11 cfs @ 10.70 hrs, Volume= 7,110 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.11 cfs @ 10.70 hrs, Volume= 7,110 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 183.37' @ 13.70 hrs Surf.Area= 1,924 sf Storage= 3,349 cf

Plug-Flow detention time= 257.8 min calculated for 7,110 cf (100% of inflow)
Center-of-Mass det. time= 257.7 min (1,020.8 - 763.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	180.84'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	181.59'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	180.84'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.11 cfs @ 10.70 hrs HW=180.90' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Pond UG-1: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

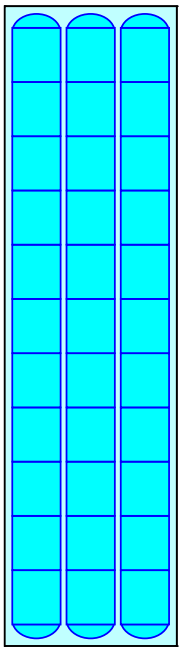
11 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 82.57' Row Length +12.0" End Stone x 2 = 84.57' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

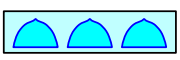
33 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 3,717.8 cf Chamber Storage

10,581.8 cf Field - 3,717.8 cf Chambers = 6,864.0 cf Stone x 40.0% Voids = 2,745.6 cf Stone Storage

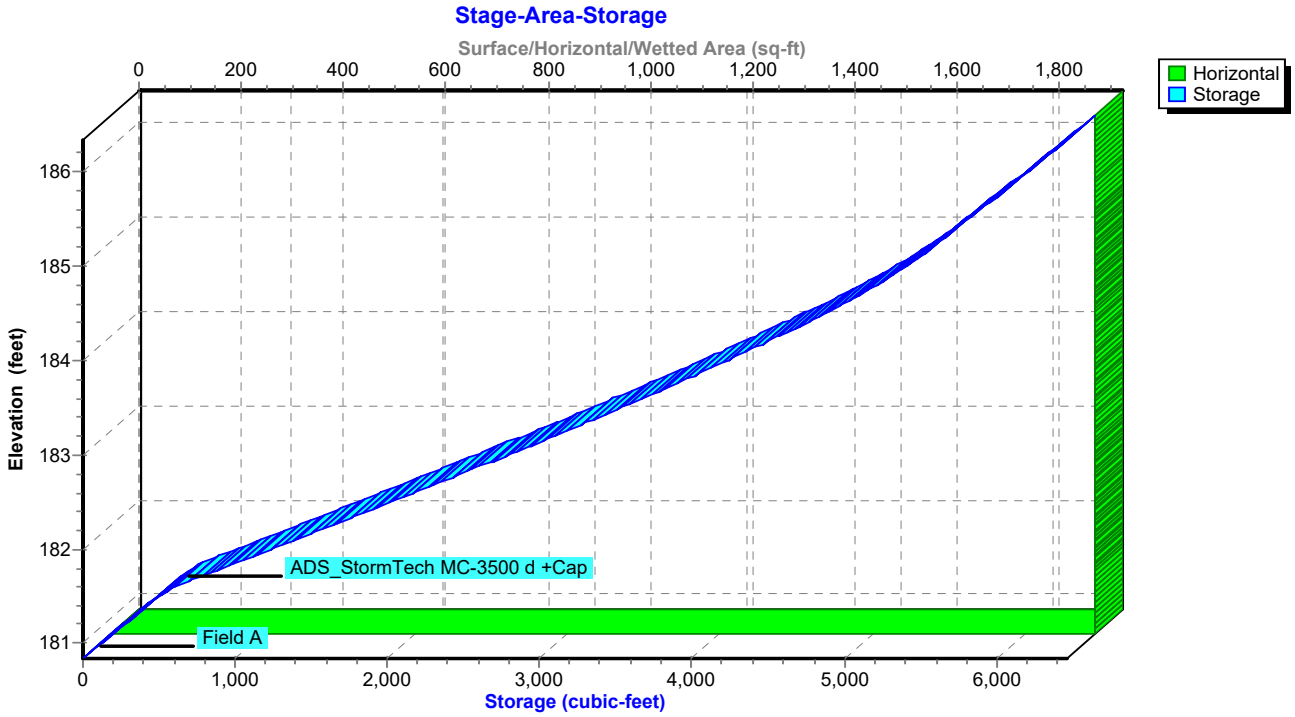
Chamber Storage + Stone Storage = 6,463.4 cf = 0.148 af
Overall Storage Efficiency = 61.1%
Overall System Size = 84.57' x 22.75' x 5.50'

33 Chambers
391.9 cy Field
254.2 cy Stone





Pond UG-1: Underground Infiltration System



Summary for Pond UG-2: Underground Infiltration System

Inflow Area = 25,632 sf, 85.58% Impervious, Inflow Depth = 3.91" for 10-Year event
Inflow = 2.78 cfs @ 12.13 hrs, Volume= 8,343 cf
Outflow = 0.14 cfs @ 11.00 hrs, Volume= 8,343 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.00 hrs, Volume= 8,343 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 183.51' @ 13.69 hrs Surf.Area= 2,576 sf Storage= 4,027 cf

Plug-Flow detention time= 247.0 min calculated for 8,335 cf (100% of inflow)
Center-of-Mass det. time= 246.9 min (1,042.8 - 796.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.22'	3,653 cf	**22.75'W x 113.25'L x 5.50'H Field A** 14,170 cf Overall - 5,037 cf Embedded = 9,133 cf x 40.0% Voids
#2A	181.97'	5,037 cf	**ADS_StormTech MC-3500 d +Cap** x 45 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 45 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		8,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.22'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 11.00 hrs HW=181.28' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond UG-2: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

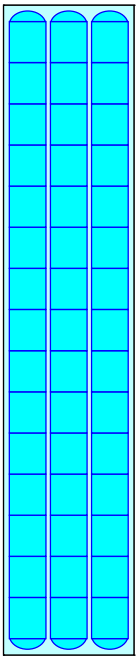
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +12.0" End Stone x 2 = 113.25' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

45 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 5,037.2 cf Chamber Storage

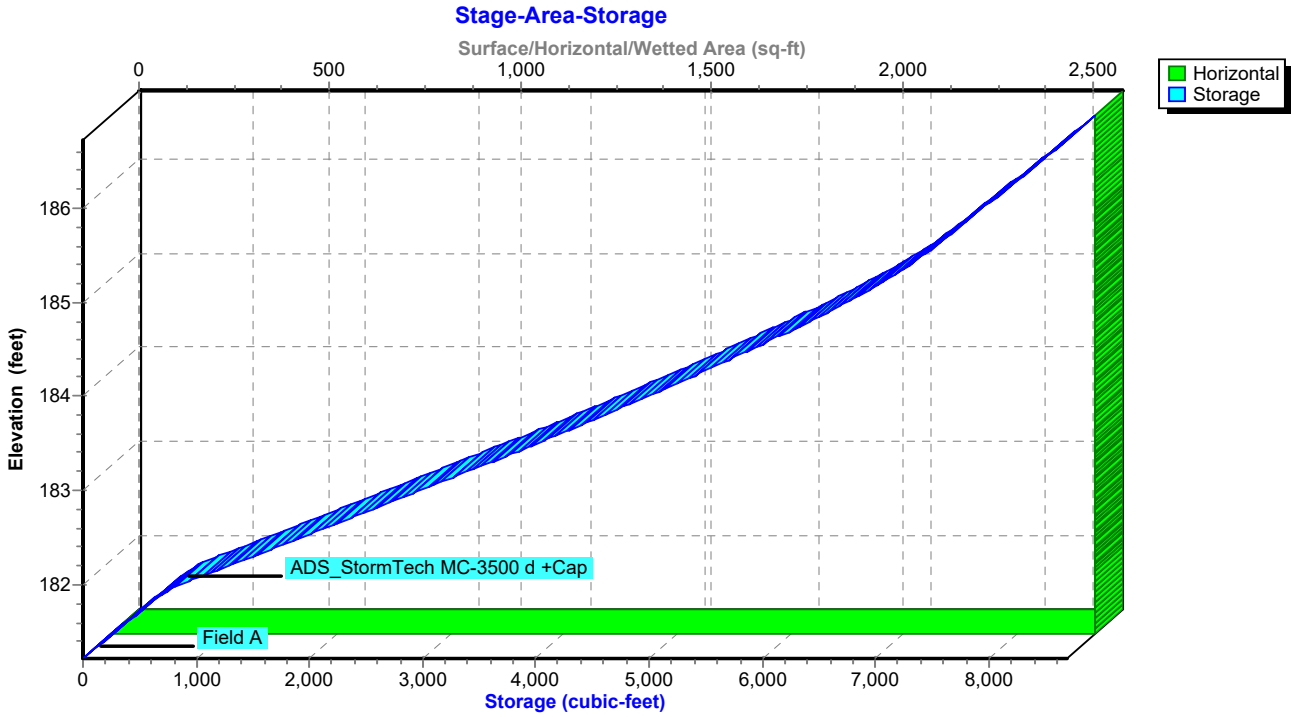
14,170.4 cf Field - 5,037.2 cf Chambers = 9,133.2 cf Stone x 40.0% Voids = 3,653.3 cf Stone Storage

Chamber Storage + Stone Storage = 8,690.5 cf = 0.200 af
Overall Storage Efficiency = 61.3%
Overall System Size = 113.25' x 22.75' x 5.50'

45 Chambers
524.8 cy Field
338.3 cy Stone



Pond UG-2: Underground Infiltration System



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=2,901 sf 2.07% Impervious Runoff Depth=0.58"
Tc=6.0 min CN=40 Runoff=0.02 cfs 140 cf

Subcatchment SUB-2A: Runoff Area=27,006 sf 60.64% Impervious Runoff Depth=3.50"
Tc=6.0 min CN=75 Runoff=2.76 cfs 7,868 cf

Subcatchment SUB-2B: Runoff Area=5,512 sf 54.35% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=71 Runoff=0.50 cfs 1,425 cf

Subcatchment SUB-3: Runoff Area=851 sf 15.28% Impervious Runoff Depth=1.12"
Tc=6.0 min CN=48 Runoff=0.02 cfs 79 cf

Subcatchment SUB-4: Runoff Area=4,965 sf 0.00% Impervious Runoff Depth=0.26"
Flow Length=84' Tc=8.7 min CN=34 Runoff=0.01 cfs 106 cf

Subcatchment SUB-5A: Runoff Area=18,262 sf 96.27% Impervious Runoff Depth=5.78"
Tc=6.0 min CN=96 Runoff=2.68 cfs 8,791 cf

Subcatchment SUB-5B: Runoff Area=25,632 sf 85.58% Impervious Runoff Depth=4.98"
Tc=6.0 min CN=89 Runoff=3.49 cfs 10,633 cf

Subcatchment SUB-5C: Runoff Area=29,927 sf 0.00% Impervious Runoff Depth=0.26"
Flow Length=245' Tc=10.3 min CN=34 Runoff=0.04 cfs 642 cf

Subcatchment SUB-5D: Runoff Area=7,234 sf 58.31% Impervious Runoff Depth=3.30"
Tc=6.0 min CN=73 Runoff=0.70 cfs 1,988 cf

Subcatchment SUB-5E: Runoff Area=797 sf 100.00% Impervious Runoff Depth=6.01"
Tc=6.0 min CN=98 Runoff=0.12 cfs 399 cf

Reach DP-1: (new Reach) Inflow=0.02 cfs 140 cf
Outflow=0.02 cfs 140 cf

Reach DP-2: Main Street Inflow=3.26 cfs 9,293 cf
Outflow=3.26 cfs 9,293 cf

Reach DP-3: (new Reach) Inflow=0.02 cfs 79 cf
Outflow=0.02 cfs 79 cf

Reach DP-4: (new Reach) Inflow=0.01 cfs 106 cf
Outflow=0.01 cfs 106 cf

Reach DP-5: Cypress Street Inflow=0.70 cfs 2,630 cf
Outflow=0.70 cfs 2,630 cf

Pond DW-1: (new Pond) Peak Elev=173.56' Storage=201 cf Inflow=0.12 cfs 399 cf
Discarded=0.00 cfs 399 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 399 cf

Pond UG-1: Underground Infiltration System Peak Elev=184.14' Storage=4,410 cf Inflow=2.68 cfs 8,791 cf
Outflow=0.11 cfs 8,791 cf

Pond UG-2: Underground Infiltration Peak Elev=184.28' Storage=5,513 cf Inflow=3.49 cfs 10,633 cf
Outflow=0.14 cfs 10,633 cf

Total Runoff Area = 123,087 sf Runoff Volume = 32,071 cf Average Runoff Depth = 3.13"
47.93% Pervious = 58,992 sf 52.07% Impervious = 64,095 sf

Summary for Subcatchment SUB-1:

Runoff = 0.02 cfs @ 12.17 hrs, Volume= 140 cf, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	2,841	39	>75% Grass cover, Good, HSG A
*	60	98	Concrete, HSG A
	2,901	40	Weighted Average
	2,841		97.93% Pervious Area
	60		2.07% Impervious Area

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

Summary for Subcatchment SUB-2A:

Runoff = 2.76 cfs @ 12.13 hrs, Volume= 7,868 cf, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	13,047	98	Paved parking, HSG A
*	1,721	98	Concrete, HSG A
	1,608	98	Roofs, HSG A
	10,630	39	>75% Grass cover, Good, HSG A
	27,006	75	Weighted Average
	10,630		39.36% Pervious Area
	16,376		60.64% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.50 cfs @ 12.13 hrs, Volume= 1,425 cf, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
2,996	98	Paved parking, HSG A
2,516	39	>75% Grass cover, Good, HSG A
5,512	71	Weighted Average
2,516		45.65% Pervious Area
2,996		54.35% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.02 cfs @ 12.15 hrs, Volume= 79 cf, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	721	39	>75% Grass cover, Good, HSG A
*	130	98	Concrete, HSG A
	851	48	Weighted Average
	721		84.72% Pervious Area
	130		15.28% Impervious Area

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

Summary for Subcatchment SUB-4:

Runoff = 0.01 cfs @ 12.58 hrs, Volume= 106 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
2,157	39	>75% Grass cover, Good, HSG A
2,808	30	Woods, Good, HSG A
4,965	34	Weighted Average
4,965		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	34	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	84	Total			

Summary for Subcatchment SUB-5A:

Runoff = 2.68 cfs @ 12.13 hrs, Volume= 8,791 cf, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	12,756	98	Paved parking, HSG A
	681	39	>75% Grass cover, Good, HSG A
	4,649	98	Roofs, HSG A
*	176	98	Concrete, HSG A
	18,262	96	Weighted Average
	681		3.73% Pervious Area
	17,581		96.27% Impervious Area

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

Summary for Subcatchment SUB-5B:

Runoff = 3.49 cfs @ 12.13 hrs, Volume= 10,633 cf, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

	Area (sf)	CN	Description
	16,222	98	Paved parking, HSG A
	3,695	39	>75% Grass cover, Good, HSG A
*	1,035	98	Concrete, HSG A
	4,680	98	Roofs, HSG A
	25,632	89	Weighted Average
	3,695		14.42% Pervious Area
	21,937		85.58% Impervious Area

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

Summary for Subcatchment SUB-5C:

Runoff = 0.04 cfs @ 12.61 hrs, Volume= 642 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
14,509	39	>75% Grass cover, Good, HSG A
13,572	30	Woods, Good, HSG A
1,846	32	Woods/grass comb., Good, HSG A
29,927	34	Weighted Average
29,927		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	70	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.3	245	Total			

Summary for Subcatchment SUB-5D:

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 1,988 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
3,016	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
1,819	98	Roofs, HSG A
7,234	73	Weighted Average
3,016		41.69% Pervious Area
4,218		58.31% Impervious Area

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

Summary for Subcatchment SUB-5E:

Runoff = 0.12 cfs @ 12.13 hrs, Volume= 399 cf, Depth= 6.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.25"

Area (sf)	CN	Description
797	98	Roofs, HSG A
797		100.00% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 2,901 sf, 2.07% Impervious, Inflow Depth = 0.58" for 25-Year event
Inflow = 0.02 cfs @ 12.17 hrs, Volume= 140 cf
Outflow = 0.02 cfs @ 12.17 hrs, Volume= 140 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Main Street

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

Inflow Area = 32,518 sf, 59.57% Impervious, Inflow Depth = 3.43" for 25-Year event
Inflow = 3.26 cfs @ 12.13 hrs, Volume= 9,293 cf
Outflow = 3.26 cfs @ 12.13 hrs, Volume= 9,293 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 851 sf, 15.28% Impervious, Inflow Depth = 1.12" for 25-Year event
Inflow = 0.02 cfs @ 12.15 hrs, Volume= 79 cf
Outflow = 0.02 cfs @ 12.15 hrs, Volume= 79 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 4,965 sf, 0.00% Impervious, Inflow Depth = 0.26" for 25-Year event
Inflow = 0.01 cfs @ 12.58 hrs, Volume= 106 cf
Outflow = 0.01 cfs @ 12.58 hrs, Volume= 106 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: Cypress Street

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

Inflow Area = 37,958 sf, 13.21% Impervious, Inflow Depth = 0.83" for 25-Year event
Inflow = 0.70 cfs @ 12.13 hrs, Volume= 2,630 cf
Outflow = 0.70 cfs @ 12.13 hrs, Volume= 2,630 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond DW-1: (new Pond)

Inflow Area = 797 sf,100.00% Impervious, Inflow Depth = 6.01" for 25-Year event
Inflow = 0.12 cfs @ 12.13 hrs, Volume= 399 cf
Outflow = 0.00 cfs @ 14.17 hrs, Volume= 399 cf, Atten= 96%, Lag= 122.4 min
Discarded = 0.00 cfs @ 14.17 hrs, Volume= 399 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 173.56' @ 14.17 hrs Surf.Area= 79 sf Storage= 201 cf

Plug-Flow detention time= 379.3 min calculated for 399 cf (100% of inflow)
Center-of-Mass det. time= 379.4 min (1,124.6 - 745.2)

Volume	Invert	Avail.Storage	Storage Description
#1	168.60'	90 cf	**10.00'D x 5.00'H Vertical Cone/Cylinder** 393 cf Overall - 169 cf Embedded = 224 cf x 40.0% Voids
#2	169.60'	113 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** Inside #1 169 cf Overall - 8.0" Wall Thickness = 113 cf
#3	173.60'	486 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		689 cf	Total Available Storage

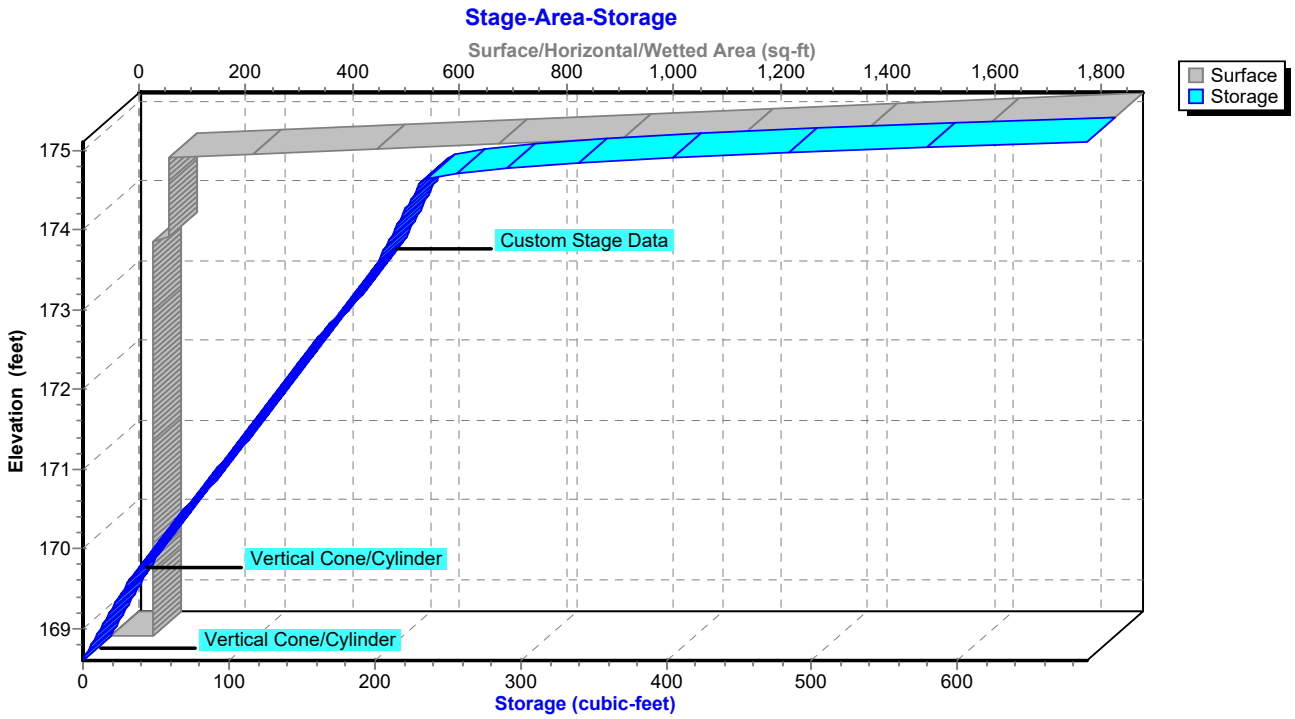
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.60	29	0	0
174.60	29	29	29
175.10	1,800	457	486

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.60'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.60'	**1.5" x 1.5" Horiz. Orifice/Grate** X 10 rows C= 0.600 in 24.0" x 24.0" Grate (4% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 14.17 hrs HW=173.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.60' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DW-1: (new Pond)



Summary for Pond UG-1: Underground Infiltration System

Inflow Area = 18,262 sf, 96.27% Impervious, Inflow Depth = 5.78" for 25-Year event
Inflow = 2.68 cfs @ 12.13 hrs, Volume= 8,791 cf
Outflow = 0.11 cfs @ 10.25 hrs, Volume= 8,791 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.11 cfs @ 10.25 hrs, Volume= 8,791 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 184.14' @ 14.29 hrs Surf.Area= 1,924 sf Storage= 4,410 cf

Plug-Flow detention time= 347.2 min calculated for 8,782 cf (100% of inflow)
Center-of-Mass det. time= 347.2 min (1,105.7 - 758.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	180.84'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	181.59'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	180.84'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.11 cfs @ 10.25 hrs HW=180.90' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Pond UG-1: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

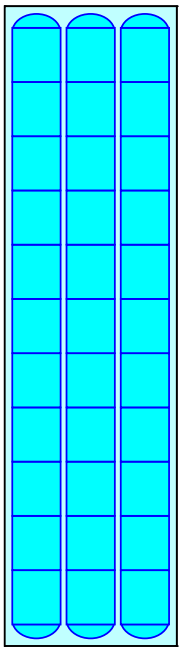
11 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 82.57' Row Length +12.0" End Stone x 2 = 84.57' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

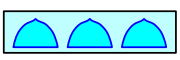
33 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 3,717.8 cf Chamber Storage

10,581.8 cf Field - 3,717.8 cf Chambers = 6,864.0 cf Stone x 40.0% Voids = 2,745.6 cf Stone Storage

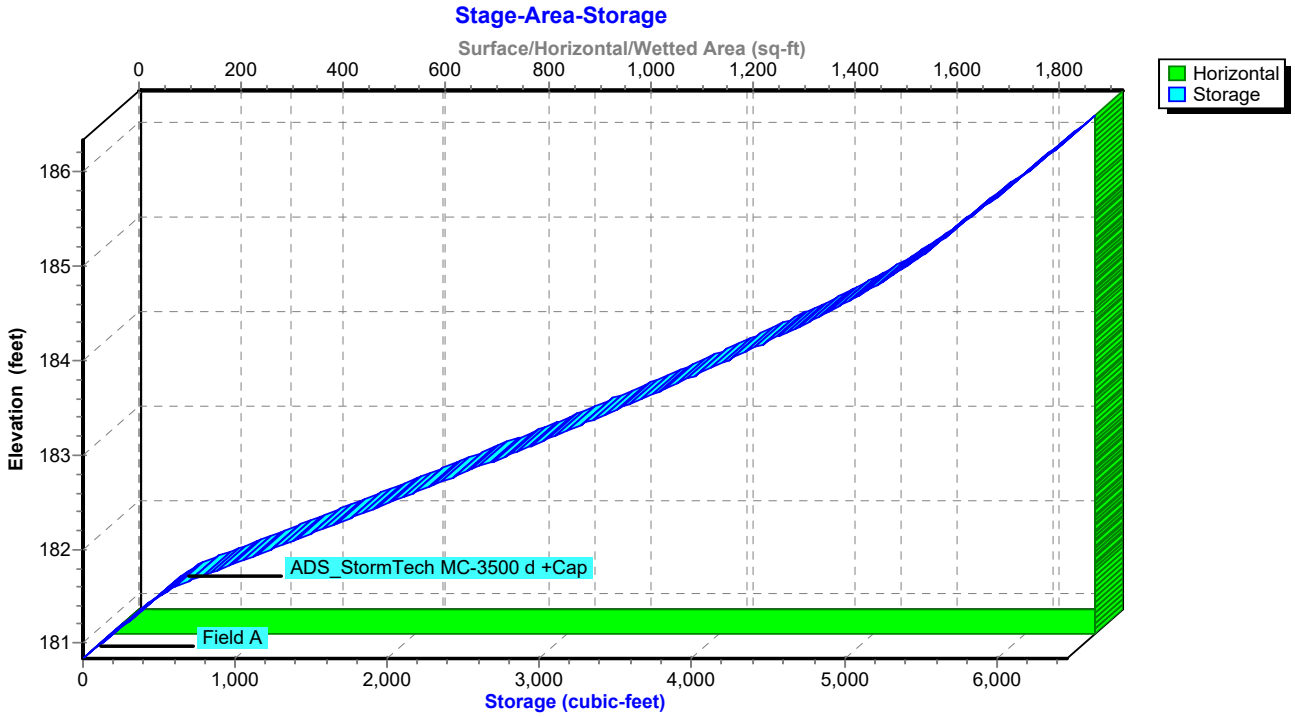
Chamber Storage + Stone Storage = 6,463.4 cf = 0.148 af
Overall Storage Efficiency = 61.1%
Overall System Size = 84.57' x 22.75' x 5.50'

33 Chambers
391.9 cy Field
254.2 cy Stone





Pond UG-1: Underground Infiltration System



Summary for Pond UG-2: Underground Infiltration System

Inflow Area = 25,632 sf, 85.58% Impervious, Inflow Depth = 4.98" for 25-Year event
Inflow = 3.49 cfs @ 12.13 hrs, Volume= 10,633 cf
Outflow = 0.14 cfs @ 10.75 hrs, Volume= 10,633 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.14 cfs @ 10.75 hrs, Volume= 10,633 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 184.28' @ 14.32 hrs Surf.Area= 2,576 sf Storage= 5,513 cf

Plug-Flow detention time= 346.0 min calculated for 10,622 cf (100% of inflow)
Center-of-Mass det. time= 345.9 min (1,135.1 - 789.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.22'	3,653 cf	**22.75'W x 113.25'L x 5.50'H Field A** 14,170 cf Overall - 5,037 cf Embedded = 9,133 cf x 40.0% Voids
#2A	181.97'	5,037 cf	**ADS_StormTech MC-3500 d +Cap** x 45 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 45 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		8,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.22'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 10.75 hrs HW=181.28' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond UG-2: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

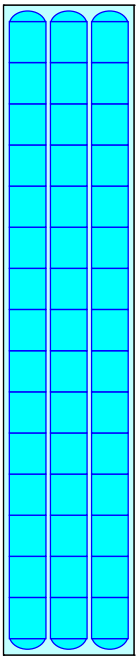
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +12.0" End Stone x 2 = 113.25' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

45 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 5,037.2 cf Chamber Storage

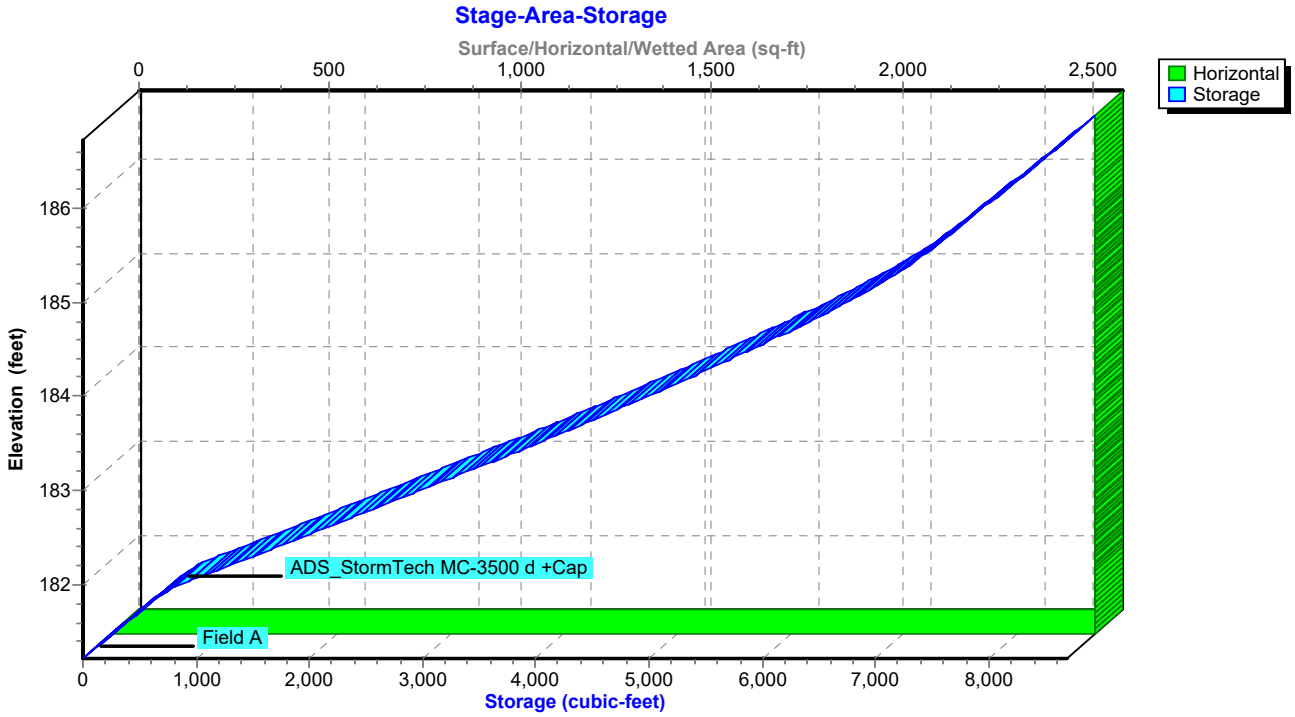
14,170.4 cf Field - 5,037.2 cf Chambers = 9,133.2 cf Stone x 40.0% Voids = 3,653.3 cf Stone Storage

Chamber Storage + Stone Storage = 8,690.5 cf = 0.200 af
Overall Storage Efficiency = 61.3%
Overall System Size = 113.25' x 22.75' x 5.50'

45 Chambers
524.8 cy Field
338.3 cy Stone



Pond UG-2: Underground Infiltration System



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 SUB-1: Runoff Area=2,901 sf 2.07% Impervious Runoff Depth=1.24"
Tc=6.0 min CN=40 Runoff=0.08 cfs 299 cf

Subcatchment SUB-2A: Runoff Area=27,006 sf 60.64% Impervious Runoff Depth=5.01"
Tc=6.0 min CN=75 Runoff=3.91 cfs 11,285 cf

Subcatchment SUB-2B: Runoff Area=5,512 sf 54.35% Impervious Runoff Depth=4.55"
Tc=6.0 min CN=71 Runoff=0.73 cfs 2,091 cf

Subcatchment SUB-3: Runoff Area=851 sf 15.28% Impervious Runoff Depth=2.02"
Tc=6.0 min CN=48 Runoff=0.05 cfs 144 cf

Subcatchment SUB-4: Runoff Area=4,965 sf 0.00% Impervious Runoff Depth=0.71"
Flow Length=84' Tc=8.7 min CN=34 Runoff=0.04 cfs 294 cf

Subcatchment SUB-5A: Runoff Area=18,262 sf 96.27% Impervious Runoff Depth=7.49"
Tc=6.0 min CN=96 Runoff=3.44 cfs 11,400 cf

Subcatchment SUB-5B: Runoff Area=25,632 sf 85.58% Impervious Runoff Depth=6.66"
Tc=6.0 min CN=89 Runoff=4.59 cfs 14,220 cf

Subcatchment SUB-5C: Runoff Area=29,927 sf 0.00% Impervious Runoff Depth=0.71"
Flow Length=245' Tc=10.3 min CN=34 Runoff=0.22 cfs 1,773 cf

Subcatchment SUB-5D: Runoff Area=7,234 sf 58.31% Impervious Runoff Depth=4.78"
Tc=6.0 min CN=73 Runoff=1.00 cfs 2,884 cf

Subcatchment SUB-5E: Runoff Area=797 sf 100.00% Impervious Runoff Depth=7.73"
Tc=6.0 min CN=98 Runoff=0.15 cfs 513 cf

Reach DP-1: (new Reach) Inflow=0.08 cfs 299 cf
Outflow=0.08 cfs 299 cf

Reach DP-2: Main Street Inflow=4.64 cfs 13,377 cf
Outflow=4.64 cfs 13,377 cf

Reach DP-3: (new Reach) Inflow=0.05 cfs 144 cf
Outflow=0.05 cfs 144 cf

Reach DP-4: (new Reach) Inflow=0.04 cfs 294 cf
Outflow=0.04 cfs 294 cf

Reach DP-5: Cypress Street Inflow=1.09 cfs 4,690 cf
Outflow=1.09 cfs 4,690 cf

Pond DW-1: (new Pond) Peak Elev=174.61' Storage=232 cf Inflow=0.15 cfs 513 cf
Discarded=0.01 cfs 480 cf Primary=0.03 cfs 33 cf Outflow=0.04 cfs 513 cf

Pond UG-1: Underground Infiltration Peak Elev=185.98' Storage=6,185 cf Inflow=3.44 cfs 11,400 cf
Outflow=0.11 cfs 11,400 cf

Pond UG-2: Underground Infiltration Peak Elev=186.04' Storage=7,989 cf Inflow=4.59 cfs 14,220 cf
Outflow=0.14 cfs 14,220 cf

Total Runoff Area = 123,087 sf Runoff Volume = 44,904 cf Average Runoff Depth = 4.38"
47.93% Pervious = 58,992 sf 52.07% Impervious = 64,095 sf

Summary for Subcatchment SUB-1:

Runoff = 0.08 cfs @ 12.15 hrs, Volume= 299 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	2,841	39	>75% Grass cover, Good, HSG A
*	60	98	Concrete, HSG A
	2,901	40	Weighted Average
	2,841		97.93% Pervious Area
	60		2.07% Impervious Area

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

Summary for Subcatchment SUB-2A:

Runoff = 3.91 cfs @ 12.13 hrs, Volume= 11,285 cf, Depth= 5.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	13,047	98	Paved parking, HSG A
*	1,721	98	Concrete, HSG A
	1,608	98	Roofs, HSG A
	10,630	39	>75% Grass cover, Good, HSG A
	27,006	75	Weighted Average
	10,630		39.36% Pervious Area
	16,376		60.64% Impervious Area

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

Summary for Subcatchment SUB-2B:

Runoff = 0.73 cfs @ 12.13 hrs, Volume= 2,091 cf, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
2,996	98	Paved parking, HSG A
2,516	39	>75% Grass cover, Good, HSG A
5,512	71	Weighted Average
2,516		45.65% Pervious Area
2,996		54.35% Impervious Area

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

Summary for Subcatchment SUB-3:

Runoff = 0.05 cfs @ 12.14 hrs, Volume= 144 cf, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	721	39	>75% Grass cover, Good, HSG A
*	130	98	Concrete, HSG A
	851	48	Weighted Average
	721		84.72% Pervious Area
	130		15.28% Impervious Area

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

Summary for Subcatchment SUB-4:

Runoff = 0.04 cfs @ 12.24 hrs, Volume= 294 cf, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
2,157	39	>75% Grass cover, Good, HSG A
2,808	30	Woods, Good, HSG A
4,965	34	Weighted Average
4,965		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	34	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	84	Total			

Summary for Subcatchment SUB-5A:

Runoff = 3.44 cfs @ 12.13 hrs, Volume= 11,400 cf, Depth= 7.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	12,756	98	Paved parking, HSG A
	681	39	>75% Grass cover, Good, HSG A
	4,649	98	Roofs, HSG A
*	176	98	Concrete, HSG A
	18,262	96	Weighted Average
	681		3.73% Pervious Area
	17,581		96.27% Impervious Area

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

Summary for Subcatchment SUB-5B:

Runoff = 4.59 cfs @ 12.13 hrs, Volume= 14,220 cf, Depth= 6.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

	Area (sf)	CN	Description
	16,222	98	Paved parking, HSG A
	3,695	39	>75% Grass cover, Good, HSG A
*	1,035	98	Concrete, HSG A
	4,680	98	Roofs, HSG A
	25,632	89	Weighted Average
	3,695		14.42% Pervious Area
	21,937		85.58% Impervious Area

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

Summary for Subcatchment SUB-5C:

Runoff = 0.22 cfs @ 12.27 hrs, Volume= 1,773 cf, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
14,509	39	>75% Grass cover, Good, HSG A
13,572	30	Woods, Good, HSG A
1,846	32	Woods/grass comb., Good, HSG A
29,927	34	Weighted Average
29,927		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0480	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
0.2	70	0.1100	5.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.6	125	0.0064	1.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.3	245	Total			

Summary for Subcatchment SUB-5D:

Runoff = 1.00 cfs @ 12.13 hrs, Volume= 2,884 cf, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
3,016	39	>75% Grass cover, Good, HSG A
2,399	98	Paved parking, HSG A
1,819	98	Roofs, HSG A
7,234	73	Weighted Average
3,016		41.69% Pervious Area
4,218		58.31% Impervious Area

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

Summary for Subcatchment SUB-5E:

Runoff = 0.15 cfs @ 12.13 hrs, Volume= 513 cf, Depth= 7.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.97"

Area (sf)	CN	Description
797	98	Roofs, HSG A
797		100.00% Impervious Area

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

Summary for Reach DP-1: (new Reach)

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

Inflow Area = 2,901 sf, 2.07% Impervious, Inflow Depth = 1.24" for 100-Year event
Inflow = 0.08 cfs @ 12.15 hrs, Volume= 299 cf
Outflow = 0.08 cfs @ 12.15 hrs, Volume= 299 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: Main Street

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

Inflow Area = 32,518 sf, 59.57% Impervious, Inflow Depth = 4.94" for 100-Year event
Inflow = 4.64 cfs @ 12.13 hrs, Volume= 13,377 cf
Outflow = 4.64 cfs @ 12.13 hrs, Volume= 13,377 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-3: (new Reach)

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

Inflow Area = 851 sf, 15.28% Impervious, Inflow Depth = 2.02" for 100-Year event
Inflow = 0.05 cfs @ 12.14 hrs, Volume= 144 cf
Outflow = 0.05 cfs @ 12.14 hrs, Volume= 144 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-4: (new Reach)

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

Inflow Area = 4,965 sf, 0.00% Impervious, Inflow Depth = 0.71" for 100-Year event
Inflow = 0.04 cfs @ 12.24 hrs, Volume= 294 cf
Outflow = 0.04 cfs @ 12.24 hrs, Volume= 294 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-5: Cypress Street

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

Inflow Area = 37,958 sf, 13.21% Impervious, Inflow Depth = 1.48" for 100-Year event
Inflow = 1.09 cfs @ 12.14 hrs, Volume= 4,690 cf
Outflow = 1.09 cfs @ 12.14 hrs, Volume= 4,690 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond DW-1: (new Pond)

Inflow Area = 797 sf,100.00% Impervious, Inflow Depth = 7.73" for 100-Year event
Inflow = 0.15 cfs @ 12.13 hrs, Volume= 513 cf
Outflow = 0.04 cfs @ 12.56 hrs, Volume= 513 cf, Atten= 76%, Lag= 25.9 min
Discarded = 0.01 cfs @ 12.56 hrs, Volume= 480 cf
Primary = 0.03 cfs @ 12.56 hrs, Volume= 33 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 174.61' @ 12.55 hrs Surf.Area= 136 sf Storage= 232 cf

Plug-Flow detention time= 367.2 min calculated for 513 cf (100% of inflow)
Center-of-Mass det. time= 367.4 min (1,109.2 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1	168.60'	90 cf	**10.00'D x 5.00'H Vertical Cone/Cylinder** 393 cf Overall - 169 cf Embedded = 224 cf x 40.0% Voids
#2	169.60'	113 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** Inside #1 169 cf Overall - 8.0" Wall Thickness = 113 cf
#3	173.60'	486 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		689 cf	Total Available Storage

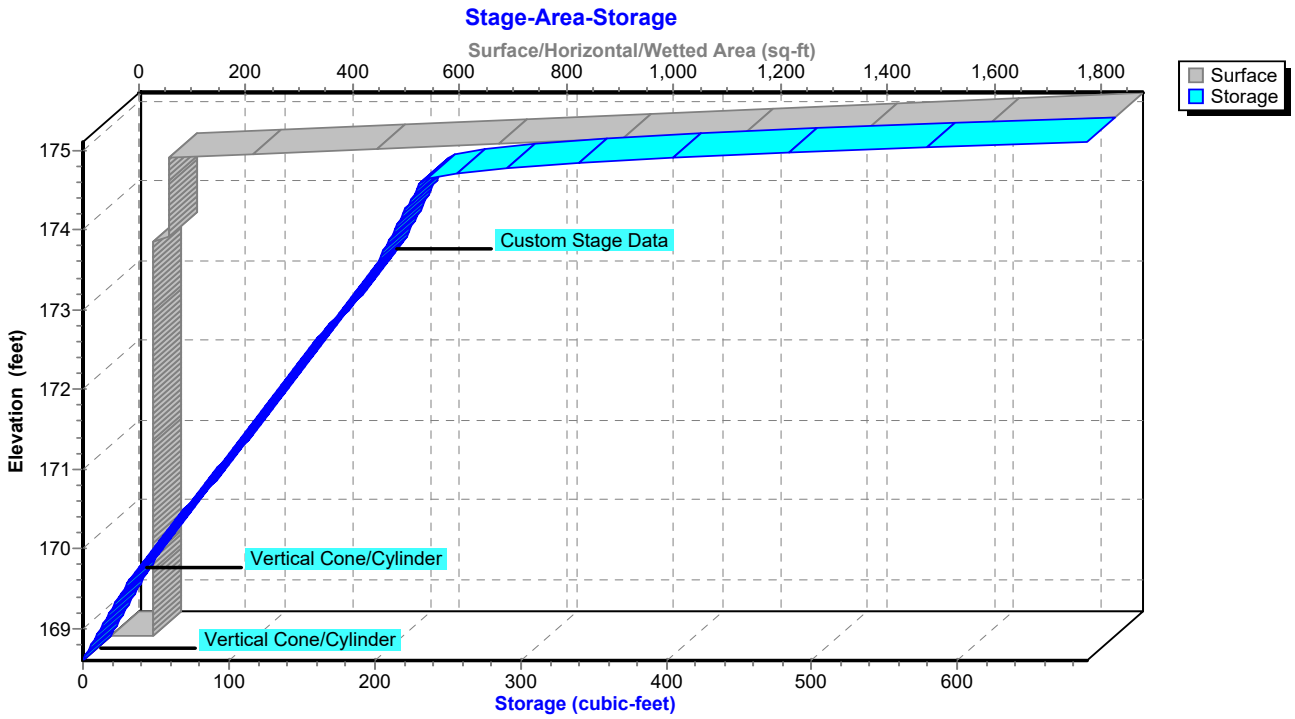
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.60	29	0	0
174.60	29	29	29
175.10	1,800	457	486

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.60'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.60'	**1.5" x 1.5" Horiz. Orifice/Grate** X 10 rows C= 0.600 in 24.0" x 24.0" Grate (4% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.56 hrs HW=174.61' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 12.56 hrs HW=174.61' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.28 fps)

Pond DW-1: (new Pond)



Summary for Pond UG-1: Underground Infiltration System

Inflow Area = 18,262 sf, 96.27% Impervious, Inflow Depth = 7.49" for 100-Year event
Inflow = 3.44 cfs @ 12.13 hrs, Volume= 11,400 cf
Outflow = 0.11 cfs @ 9.60 hrs, Volume= 11,400 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.11 cfs @ 9.60 hrs, Volume= 11,400 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 185.98' @ 14.88 hrs Surf.Area= 1,924 sf Storage= 6,185 cf

Plug-Flow detention time= 493.2 min calculated for 11,388 cf (100% of inflow)
Center-of-Mass det. time= 493.4 min (1,246.9 - 753.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	180.84'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	181.59'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	180.84'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.11 cfs @ 9.60 hrs HW=180.90' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Pond UG-1: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

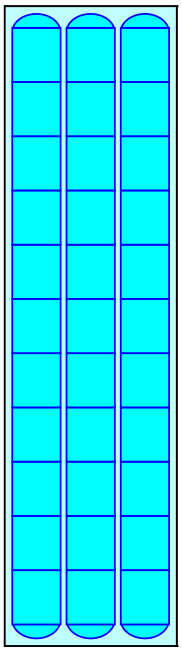
11 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 82.57' Row Length +12.0" End Stone x 2 = 84.57' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

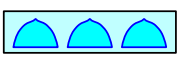
33 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 3,717.8 cf Chamber Storage

10,581.8 cf Field - 3,717.8 cf Chambers = 6,864.0 cf Stone x 40.0% Voids = 2,745.6 cf Stone Storage

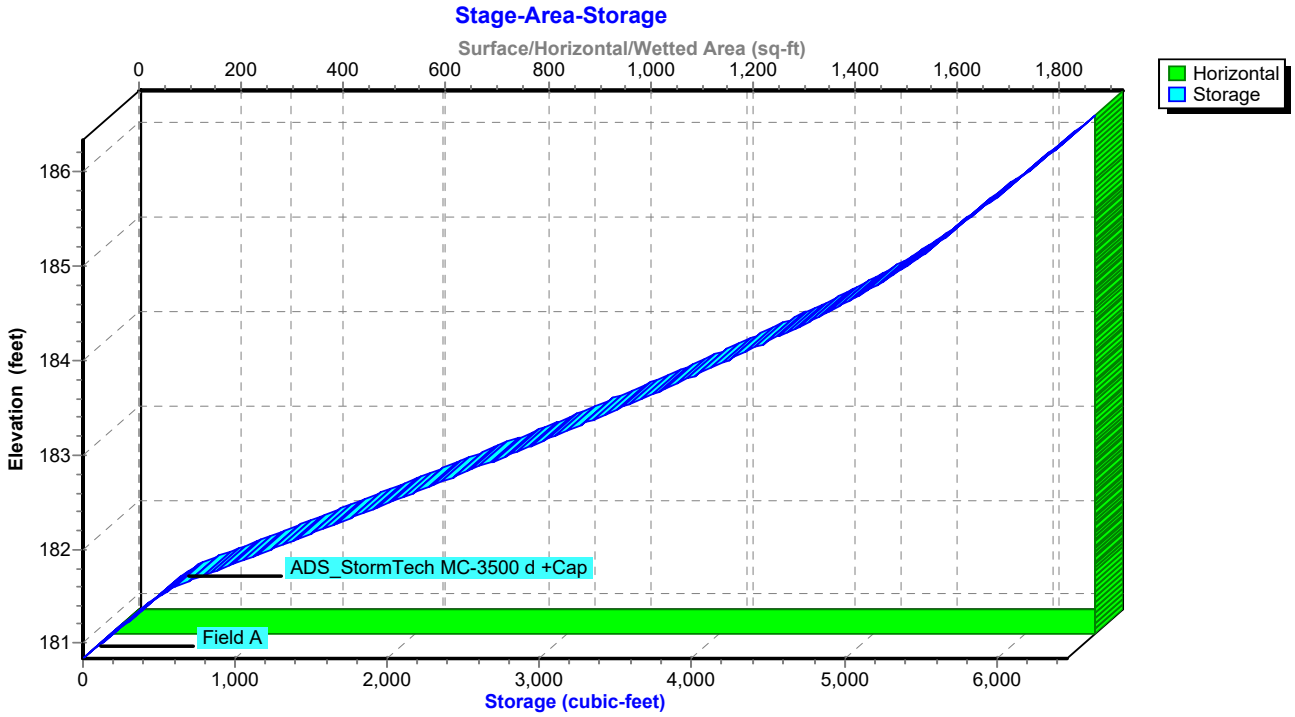
Chamber Storage + Stone Storage = 6,463.4 cf = 0.148 af
Overall Storage Efficiency = 61.1%
Overall System Size = 84.57' x 22.75' x 5.50'

33 Chambers
391.9 cy Field
254.2 cy Stone





Pond UG-1: Underground Infiltration System



Summary for Pond UG-2: Underground Infiltration System

Inflow Area = 25,632 sf, 85.58% Impervious, Inflow Depth = 6.66" for 100-Year event
Inflow = 4.59 cfs @ 12.13 hrs, Volume= 14,220 cf
Outflow = 0.14 cfs @ 10.05 hrs, Volume= 14,220 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.14 cfs @ 10.05 hrs, Volume= 14,220 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 186.04' @ 14.93 hrs Surf.Area= 2,576 sf Storage= 7,989 cf

Plug-Flow detention time= 503.5 min calculated for 14,220 cf (100% of inflow)
Center-of-Mass det. time= 503.4 min (1,284.6 - 781.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.22'	3,653 cf	**22.75'W x 113.25'L x 5.50'H Field A** 14,170 cf Overall - 5,037 cf Embedded = 9,133 cf x 40.0% Voids
#2A	181.97'	5,037 cf	**ADS_StormTech MC-3500 d +Cap** x 45 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 45 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		8,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.22'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 10.05 hrs HW=181.28' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond UG-2: Underground Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

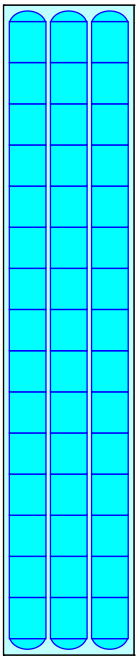
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +12.0" End Stone x 2 = 113.25' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

45 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 5,037.2 cf Chamber Storage

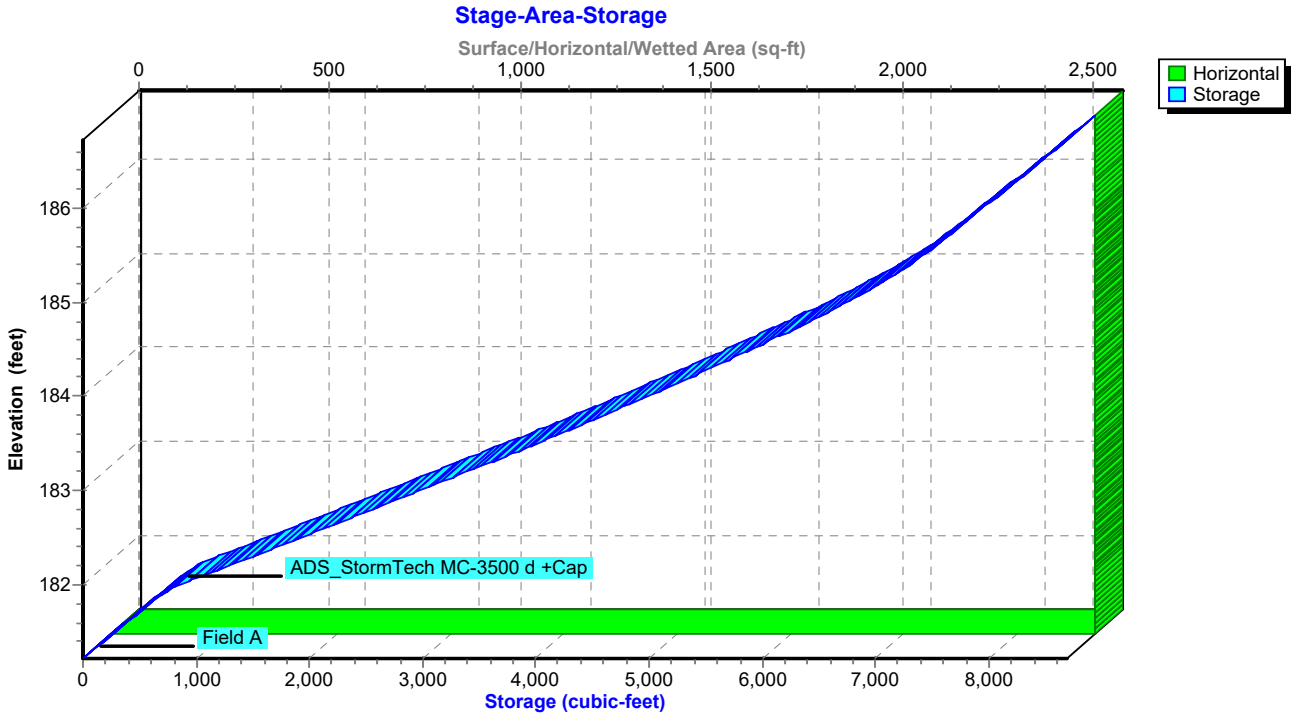
14,170.4 cf Field - 5,037.2 cf Chambers = 9,133.2 cf Stone x 40.0% Voids = 3,653.3 cf Stone Storage

Chamber Storage + Stone Storage = 8,690.5 cf = 0.200 af
Overall Storage Efficiency = 61.3%
Overall System Size = 113.25' x 22.75' x 5.50'

45 Chambers
524.8 cy Field
338.3 cy Stone



Pond UG-2: Underground Infiltration System



SOIL TEST DATA

SOIL TESTING AND EVALUATION BY: DAVID NEWHALL S.E. #14226
SOIL TESTING WITNESSED BY: UNWITNESSED
DATE: NOVEMBER 24, 2020

TP-1 — APPROX. GRADE EL. 189.5

	A HORIZON LOAMY SAND 10YR 3/2	16"
EL. 188.2	B HORIZON LOAMY SAND 10YR 5/6	32"
EL. 186.8	B/C HORIZON LOAMY SAND 10YR 4/4	52"
EL. 185.2	C1 HORIZON SAND 2.5Y 6/2	156"
EL. 176.5		

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >156"

TP-2 — APPROX. GRADE EL. 189.6

	A HORIZON LOAMY SAND 10YR 3/2	16"
EL. 188.3	B HORIZON LOAMY SAND 10YR 5/6	30"
EL. 187.1	B/C HORIZON LOAMY SAND 10YR 4/4	72"
EL. 183.6	C1 HORIZON SAND 2.5Y 6/2	162"
EL. 176.1		

MOTTLING OBSERVED: 120" (EL. 179.6)
WEEPING OBSERVED: NONE
E.S.H.G.W.: 120" (EL. 179.6)

TP-3 — APPROX. GRADE EL. 189.0

	FILL	44"
EL. 185.3	C1 HORIZON SAND 2.5Y 6/2	144"
EL. 177.0		

MOTTLING OBSERVED: 132" (EL. 178.0)
WEEPING OBSERVED: NONE
E.S.H.G.W.: 132" (EL. 178.0)

TP-4 — APPROX. GRADE EL. 186.5

	FILL	48"
EL. 182.5	C1 HORIZON SAND 2.5Y 6/2	150"
EL. 174.0		

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >150"

TP-5 — APPROX. GRADE EL. 186.2

	A HORIZON LOAMY SAND 10YR 3/2	12"
EL. 188.3	B HORIZON LOAMY SAND 10YR 5/6	24"
EL. 187.1	C1 HORIZON SAND 2.5Y 5/3	150"
EL. 183.6		

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >150"

TP-6 — APPROX. GRADE EL. 174.5

	A HORIZON LOAMY SAND 10YR 3/2	12"
EL. 173.5	B HORIZON LOAMY SAND 10YR 5/8	24"
EL. 172.5	C HORIZON LOAMY SAND 10YR 4/4	66"
EL. 169.0	C2 HORIZON SAND 2.5Y 5/3	120"
EL. 164.5		

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >120"

TP-7 — APPROX. GRADE EL. 176.4

	A HORIZON LOAMY SAND 10YR 3/2	12"
EL. 173.5	B HORIZON LOAMY SAND 10YR 5/8	24"
EL. 172.5	C HORIZON LOAMY SAND 10YR 4/4	66"
EL. 169.0	C2 HORIZON SAND 2.5Y 5/3	120"
EL. 166.4		

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >120"

SOIL TEST DATA

SOIL TESTING AND EVALUATION BY: TAYLOR CORSANO S.E. #14263
SOIL TESTING WITNESSED BY: UNWITNESSED
DATE: AUGUST 22, 2022

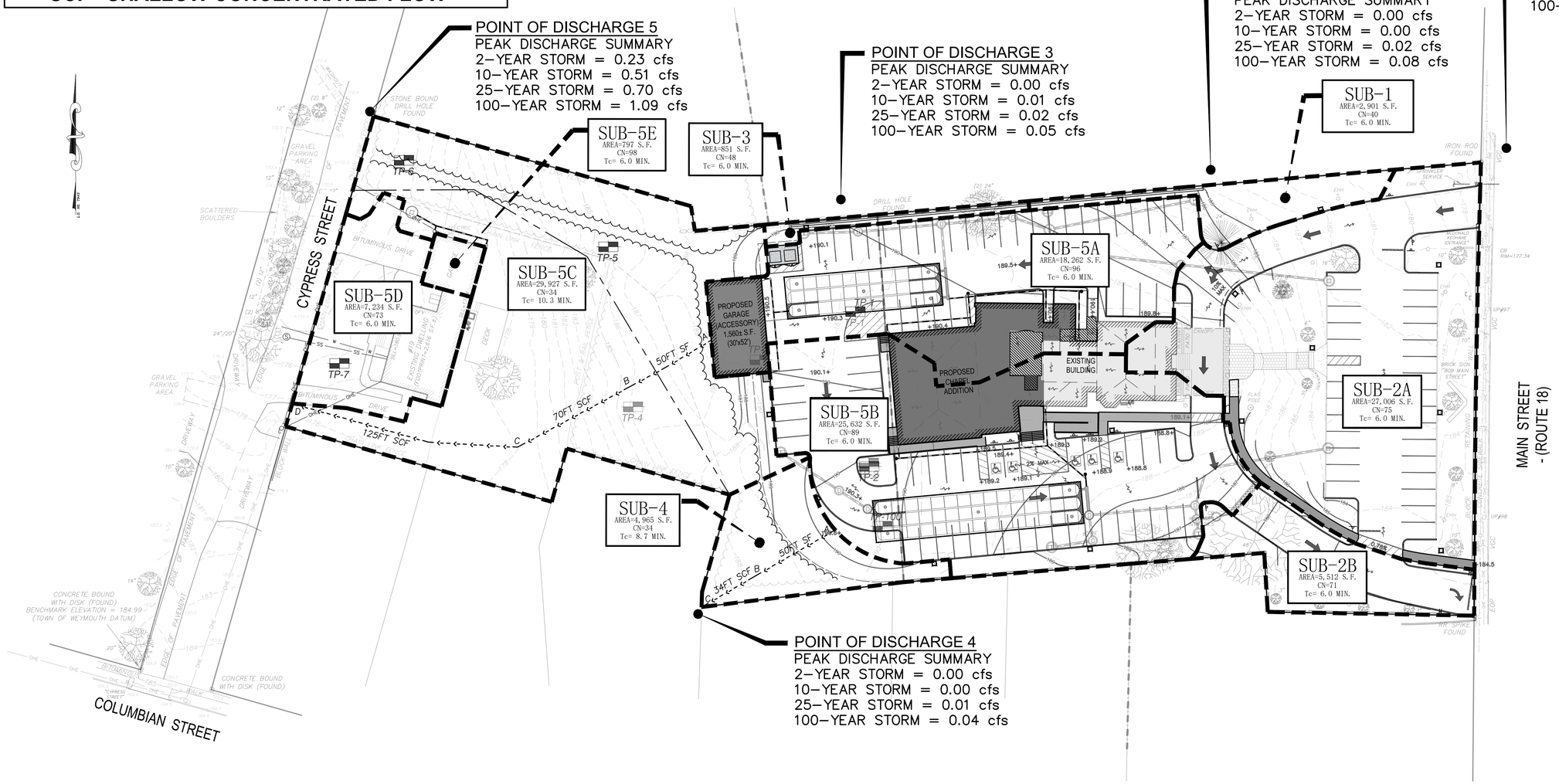
TP-100 — APPROX. GRADE EL. 190.0

	A/B HORIZON LOAM 7.5YR 2.5/2	12"
EL. 189.0	C1 HORIZON LOAMY SAND 7.5YR 5/4	48"
EL. 186.0	C2 HORIZON SAND W/ FINES 7.5YR 8/4	120"
EL. 180.0		

MOTTLING OBSERVED: NONE
WEEPING OBSERVED: NONE
E.S.H.G.W.: >120"

MAP UNIT SYMBOL	MAP UNIT NAME	HYDROLOGIC RATING
623C	WOODBRIDGE-URBAN LAND COMPLEX, 3-15% SLOPES	D
628C	CANTON-URBAN LAND COMPLEX, 3-15% SLOPES	A
602	URBAN LAND, 0-15% SLOPES	UNRANKED

SF=SHEET FLOW
SCF= SHALLOW CONCENTRATED FLOW



SCALE: 1" = 30'
30 0 15 30 60

Date	Description	No.
	Revisions	
10-12-22	ZBA HEARING COMMENTS	3
8-24-22	ZBA HEARING COMMENTS	2
4-8-22	ADDRESS ENGINEERING COMMENTS	1

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

10-12-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

Project
MCDONALD-KEOHANE FUNERAL HOME - SOUTH
809 MAIN STREET
WEYMOUTH, MA 02190

Prepared for
MCDONALD KEOHANE FUNERAL HOME, INC.
785 HANCOCK STREET
QUINCY, MA 02170

Drawing Title
POST-CONSTRUCTION WATERSHED PLAN

Project No.	100-060
Date	02 / 04 / 2022
Scale	SEE PLAN
Drawn By	CM / JM
Approved By	GRC

Drawing No.
WS-2

SECTION 4 – STORMWATER MANAGEMENT CALCS

4.1 RECHARGE CALCULATIONS

The Required Recharge Volume is computed using the equation provided in the 2008 Massachusetts Stormwater Handbook. The volume is computed as an equivalent depth of rainfall over the proposed impervious areas in accordance with a Target Depth Factor based on the soil classifications. The Calculations is as follows:

- Rv = F x impervious area (Equation 1) Volume 3, Ch 1, page 15
- *Rv = Required Recharge Volume*, expressed in cubic feet, cubic yards, or acre-feet
- *F* = Target Depth Factor associated with each Hydrologic Soil Group (HSG)
- *Impervious Area* = new pavement and new rooftop area
- *The Target Depth Factor "F" per Table 2.3.2, Volume 3, Chapter 1 for each soil classification is as follows:*
    - A soils = 0.60 inches
    - B soils = 0.35 inches
    - C soils = 0.25 inches
    - D soils = 0.10 inches

Based on the above formula, the required recharge volume for the site is as follows:

Recharge Within "A" Soils:

- Impervious Area = 16,141 SF
- 0.6 inches x 1/12 feet x 16,141 SF = 807.05 CUBIC FEET

TOTAL RECHARGE VOLUME REQUIRED = 807 CUBIC FEET

Capture Area Adjustment:

23,780 S.F. of impervious does not go to recharge BMPs. Thus, the balance of impervious area, 40,315 S.F. is directed to recharge BMPs. Performing the capture area adjustment. Dividing total impervious area of 64,095 S.F. by impervious area draining to recharge areas, 40,315 S.F. yields an adjusted required recharge volume of 1.59 times the calculated amount. Thus, 1.59 x 807 S.F. yields an adjusted total recharge volume required of 1,283 cubic feet.

TOTAL RECHARGE VOLUME PROVIDED = 14,409 CUBIC FEET (see next page)

Recharge Volume BMP Table

TOTAL RECHARGE VOLUME			
Infiltration BMP	***Infiltration Rate (in/hr) k***	***Storage (Recharge) Volume (c.f.) Rv***	***Bottom Area (s.f.)***
UG-1	*2.41*	*6,186*	*1,924*
UG-2	*2.41*	*7,990*	*2,576*
DW-1	*2.41*	*233*	*178*
Totals		***14,409***	
k = saturdated hydraulic conductivity (in/hr) *Rv = storage volume (c.f.)* *Bottom Area (s.f.)* *Volume 3, Chapter 1 of the MA Stormwater Handbook*			

The Storage Recharge volume numbers provided in the table above have been derived utilizing the HydroCAD output for stage storage. The following pages provide a copy of those printouts and the cumulative stage-storage up to the controlling invert elevation has been highlighted.

Conclusion:

The recharge provided by the proposed underground systems exceeds the required recharge. The project satisfies Standard 3 of the Massachusetts DEP Stormwater Regulations.

4.2 DRAWDOWN TIME

Below are the drawdown time calculations for the infiltration systems proposed on the site. The calculation uses estimated hydraulic conductivity values "*K*" in accordance with the Rawls Rates table. The formula below utilized the recommended formula per the MA Stormwater Handbook as follows:

- Drawdown Time = Rv / (K*Bottom Area)
- Rv = Storage Volume (cf)
- K – Saturated Hydraulic Conductivity per Rawls Rate Table
- Bottom Area = Area of Bottom of Proposed Recharge Structure

Below is a summary table of the drawdown calculations:

BASIN DRAWDOWN CALCULATIONS

Infiltration BMP	***Infiltration Rate (in/hr) k***	***Storage (Recharge) Volume (c.f.) Rv***	***Bottom Area (s.f.)***	***Draw Down Time(hours)***
UG-1	*2.41*	*6,186*	*1,924*	16.0
UG-2	*2.41*	*7,990*	*2,576*	15.4
DW-1	*2.41*	*233*	*178*	6.5
Totals		***14,409***		38.0

k = saturdated hydraulic conductivity (in/hr)
Rv = storage volume (c.f.)
Bottom Area (s.f.)
Volume 3, Chapter 1 of the MA Stormwater Handbook

Conclusion:

The calculations show that the infiltration BMP draws down in less than 72 hours, as required.

4.3 WATER QUALITY

A table has been provided below that provides the sizing of the proprietary water quality units selected. All the proprietary BMP's have been sized to treat 1" water quality volume (WQV) of the contributing tributary area.

Water Quality Unit Sizing Using Equivalent Flow from 1" Rainfall Depth

Basin / WQ structure	Tributary Area (acres)	Tributary Area (sq miles)	Pervious (sf)	Impervious %	CN Value (Estimated)	WQV (In)	Tc (min)	qu (csm/in)	WQF = qu A Q (cfs)	Unit
WQU #1	0.30	0.0009	682	95%	96	1.00	6	795	0.66	CDS 1515-3-C
WQU #2	0.21	0.0010	1,808	80%	91	1.00	6	795	0.61	CDS 1515-3-C
WQU #3	0.15	0.0010	1,144	82%	92	1.00	6	795	0.63	CDS 1515-3-C
WQU #4	0.13	0.0010	493	91%	95	1.00	6	795	0.69	CDS 2015

Three (3) CDS model 1515-3-C are proposed to handle the treatment for Water Quality Units 1, 2, and 3. The unit has rated treatment capacity is 1.0 cfs and is equipped with a fiberglass separation cylinder that allows larger flows to bypass. Water Quality Unit 4 will be CDS model 2015 and has a rated treatment capacity of 0.7 cfs and is also equipped with a fiberglass separation cylinder that allows larger flows to bypass. Please see Section 4.5: TSS Removal for more information.

4.4 RIP RAP SPLASH PAD

Rip rap splash pads are designed to dissipate energy, prevent scour at the stormwater outlet, and minimize the potential for downstream erosion. A Rip Rap Splash pad calculation is not required because the underground system was designed to have no discharge up through the 100-year storm event.

Conclusion:

The outflow of each system will be controlled by an outlet control structure with a weir set at the peak elevation of the 100-yr storm event. In the event of an emergency, water will be directed to an emergency outflow catch basin and then flow to Main Street.

4.5 TSS REMOVAL

The project has been designed to comply with the required 80% TSS (minimum) removal per the Massachusetts Stormwater Regulations. Various combinations of stormwater BMPs including deep sump hooded catch basins, proprietary water quality units, and subsurface infiltration systems are utilized.

Please refer to the attached TSS calculation sheets that follow:

Stage-Area-Storage for Pond UG-1: Underground Infiltration System (continued)

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
185.00	1,924	5,411
185.02	1,924	5,429
185.04	1,924	5,447
185.06	1,924	5,465
185.08	1,924	5,482
185.10	1,924	5,499
185.12	1,924	5,516
185.14	1,924	5,533
185.16	1,924	5,549
185.18	1,924	5,566
185.20	1,924	5,583
185.22	1,924	5,599
185.24	1,924	5,615
185.26	1,924	5,631
185.28	1,924	5,647
185.30	1,924	5,663
185.32	1,924	5,678
185.34	1,924	5,694
185.36	1,924	5,709
185.38	1,924	5,725
185.40	1,924	5,740
185.42	1,924	5,755
185.44	1,924	5,771
185.46	1,924	5,786
185.48	1,924	5,802
185.50	1,924	5,817
185.52	1,924	5,832
185.54	1,924	5,848
185.56	1,924	5,863
185.58	1,924	5,879
185.60	1,924	5,894
185.62	1,924	5,909
185.64	1,924	5,925
185.66	1,924	5,940
185.68	1,924	5,955
185.70	1,924	5,971
185.72	1,924	5,986
185.74	1,924	6,002
185.76	1,924	6,017
185.78	1,924	6,032
185.80	1,924	6,048
185.82	1,924	6,063
185.84	1,924	6,079
185.86	1,924	6,094
185.88	1,924	6,109
185.90	1,924	6,125
185.92	1,924	6,140
185.94	1,924	6,156
185.96	1,924	6,171
185.98	1,924	6,186
186.00	1,924	6,202
186.02	1,924	6,217
186.04	1,924	6,233
186.06	1,924	6,248
186.08	1,924	6,263
186.10	1,924	6,279
186.12	1,924	6,294
186.14	1,924	6,309
186.16	1,924	6,325
186.18	1,924	6,340
186.20	1,924	6,356
186.22	1,924	6,371
186.24	1,924	6,386
186.26	1,924	6,402
186.28	1,924	6,417
186.30	1,924	6,433
186.32	1,924	6,448
186.34	1,924	**6,463**

Stage-Area-Storage for Pond UG-2: Underground Infiltration System (continued)

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
185.38	2,576	7,281
185.40	2,576	7,305
185.42	2,576	7,329
185.44	2,576	7,353
185.46	2,576	7,376
185.48	2,576	7,399
185.50	2,576	7,422
185.52	2,576	7,444
185.54	2,576	7,467
185.56	2,576	7,489
185.58	2,576	7,511
185.60	2,576	7,533
185.62	2,576	7,554
185.64	2,576	7,576
185.66	2,576	7,597
185.68	2,576	7,618
185.70	2,576	7,639
185.72	2,576	7,660
185.74	2,576	7,681
185.76	2,576	7,701
185.78	2,576	7,722
185.80	2,576	7,742
185.82	2,576	7,763
185.84	2,576	7,784
185.86	2,576	7,804
185.88	2,576	7,825
185.90	2,576	7,845
185.92	2,576	7,866
185.94	2,576	7,887
185.96	2,576	7,907
185.98	2,576	7,928
186.00	2,576	7,948
186.02	2,576	7,969
186.04	2,576	7,990
186.06	2,576	8,010
186.08	2,576	8,031
186.10	2,576	8,052
186.12	2,576	8,072
186.14	2,576	8,093
186.16	2,576	8,113
186.18	2,576	8,134
186.20	2,576	8,155
186.22	2,576	8,175
186.24	2,576	8,196
186.26	2,576	8,216
186.28	2,576	8,237
186.30	2,576	8,258
186.32	2,576	8,278
186.34	2,576	8,299
186.36	2,576	8,319
186.38	2,576	8,340
186.40	2,576	8,361
186.42	2,576	8,381
186.44	2,576	8,402
186.46	2,576	8,423
186.48	2,576	8,443
186.50	2,576	8,464
186.52	2,576	8,484
186.54	2,576	8,505
186.56	2,576	8,526
186.58	2,576	8,546
186.60	2,576	8,567
186.62	2,576	8,587
186.64	2,576	8,608
186.66	2,576	8,629
186.68	2,576	8,649
186.70	2,576	8,670
186.72	2,576	**8,691**

Stage-Area-Storage for Pond DW-1: (new Pond) (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
172.76	79	167
172.78	79	168
172.80	79	168
172.82	79	169
172.84	79	170
172.86	79	171
172.88	79	172
172.90	79	173
172.92	79	173
172.94	79	174
172.96	79	175
172.98	79	176
173.00	79	177
173.02	79	178
173.04	79	179
173.06	79	179
173.08	79	180
173.10	79	181
173.12	79	182
173.14	79	183
173.16	79	184
173.18	79	185
173.20	79	185
173.22	79	186
173.24	79	187
173.26	79	188
173.28	79	189
173.30	79	190
173.32	79	191
173.34	79	191
173.36	79	192
173.38	79	193
173.40	79	194
173.42	79	195
173.44	79	196
173.46	79	197
173.48	79	197
173.50	79	198
173.52	79	199
173.54	79	200
173.56	79	201
173.58	79	202
173.60	108	203
173.62	108	203
173.64	108	204
173.66	108	204
173.68	108	205
173.70	108	205
173.72	108	206
173.74	108	207
173.76	108	207
173.78	108	208
173.80	108	208
173.82	108	209
173.84	108	210
173.86	108	210
173.88	108	211
173.90	108	211
173.92	108	212
173.94	108	212
173.96	108	213
173.98	108	214
174.00	108	214
174.02	108	215
174.04	108	215
174.06	108	216
174.08	108	217
174.10	108	217
174.12	108	218
174.14	108	218
174.16	108	219
174.18	108	219
174.20	108	220
174.22	108	221
174.24	108	221
174.26	108	222
174.28	108	222
174.30	108	223
174.32	108	223
174.34	108	224
174.36	108	225
174.38	108	225
174.40	108	226
174.42	108	226
174.44	108	227
174.46	108	228
174.48	108	228
174.50	108	229
174.52	108	229
174.54	108	230
174.56	108	230
174.58	108	231
174.60	108	232
174.62	178	233
174.64	249	236
174.66	320	240
174.68	391	245
174.70	462	252
174.72	533	261
174.74	603	270
174.76	674	282
174.78	745	294
174.80	816	308
174.82	887	324

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: **Concrete Drywell (DW-1)**

TSS Removal Calculation Worksheet

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

***No impervious area directed to drywell.**

Total TSS Removal = **80%**

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

Project: **100-060 MacDonald-Keohane**

Prepared By: **CRM**

Date: **10/11/2022**

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: **CDS Water Quality Unit 1515-3 (WQU#1)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
CDS Proprietary Treatment Device Model 1515-3 (Structure ID: WQU#1)	**0.80**	**0.75**	**0.60**	**0.15**

Total TSS Removal = **85%**

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

Project: **100-060 MacDonald-Keohane**

Prepared By: **CRM**

Date: **10/11/2022**

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: **CDS Water Quality Unit 1515-3 (WQU#2)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
CDS Proprietary Treatment Device Model 1515-3 (Structure ID: WQU#2)	**0.80**	**0.75**	**0.60**	**0.15**

Total TSS Removal = **85%**

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

Project: **100-060 MacDonald-Keohane**

Prepared By: **CRM**

Date: **10/11/2022**

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: **CDS Water Quality Unit 1515-3 (WQU#3)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
CDS Proprietary Treatment Device Model 1515-3 (Structure ID: WQU#3)	**0.80**	**0.75**	**0.60**	**0.15**

Total TSS Removal = **85%**

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

Project: **100-060 MacDonald-Keohane**

Prepared By: **CRM**

Date: **10/11/2022**

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: **CDS Water Quality Unit 2015 (WQU#4)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
CDS Proprietary Treatment Device Model 2015 (Structure ID: WQU#4)	**0.80**	**0.75**	**0.60**	**0.15**

Total TSS Removal = **85%**

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

Project: **100-060 MacDonald-Keohane**

Prepared By: **CRM**

Date: **10/11/2022**

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

SECTION 5- LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN

LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN
McDonald-Keohane Funeral Home - South

PROJECT OVERVIEW:

The proposed project consists of the construction of 5,370+/- s.f. addition off the rear of the existing funeral home and an accessory 1,560+/- s.f. garage. The project also proposes additional parking and site infrastructure on the existing 2.82 +/- acre site. The project has been designed to comply with the Massachusetts Stormwater Management Regulations.

Appended to this document is a sample maintenance form and a chart describing the anticipated frequency of tasks.

OWNER AND RESPONSIBLE PARTY:

Current Land Owners:
MK Main Street, LLC
785 Hancock Street
Quincy, MA 02170

MK Charles Street, LLC
785 Hancock Street
Quincy, MA 02170

Contractor should have facilities maintenance personnel on-staff. For any service beyond their service ability, the contractor should subcontract to the appropriate vendors such as street sweeping, catch basin and water quality unit cleaning, etc.

Ultimately, the owner will take over long-term O&M Responsibilities upon project completion and turnover from the contractor to the owner.

CONSTRUCTION MANAGEMENT:

A construction manager with adequate knowledge and experience on projects of similar size and scope shall be employed to oversee all site work related construction. The contractor shall incorporate the appropriate techniques to control sediment and erosion pollution during construction in accordance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* and any conditions of approval from the local conservation commission.

Care should be taken when constructing stormwater control structures. Light earth-moving equipment shall be used to excavate in the vicinity of the infiltration areas. Use of heavy-

equipment causes excessive compaction of the soils beneath the basin resulting in reduced infiltration capacity. At no time shall temporary infiltration areas or settling basins be constructed in the vicinity of the proposed infiltration basins in order to prevent the soils from becoming clogged with sediment.

ON-GOING MAINTENANCE CONTRACT

The non-structural and structural approaches recommended below, as well as the required BMP maintenance, will be completed by the selected contractor. Adequate personnel with appropriate training and access to proper equipment will be available to complete the tasks. Future responsible parties must be notified of their responsibility to operate and maintain the system in perpetuity.

MAINTENANCE LOG

The Responsible Party shall develop and maintain a log of inspections, maintenance, repairs, and disposal (including location of disposal) during the life of the project. Records will be maintained for at least 3 years and be made available to the Massachusetts Department of Environmental Protection or the Town of Weymouth in accordance with the provisions of the Massachusetts Stormwater Handbook. A sample of such a maintenance log is provided.

STORMWATER BMP MAINTENANCE

The proposed stormwater management system has been designed with appropriate BMPs aimed at reducing the pollutants discharge based upon the intended use of the property. All BMPs require regular maintenance to function as intended. Some management measures have simple maintenance requirements; others are more involved. The Responsible Party must have all BMPs regularly inspected to ensure they are operating properly on an as needed basis, including during runoff events exceeding 0.5 inches of rainfall.

A description of the non-structural and structural approaches to be incorporated is indicated below. The following best management practices are proposed to be incorporated into the stormwater management design to reduce source runoff and improve stormwater runoff discharge quality. The Responsible Party will regularly inspect all BMPs to ensure they are operating properly. If any deficiencies are identified during these inspections, action to resolve it will be initiated and documented on the maintenance log.

STRUCTURAL BMPs

Deep Sump Hooded Catch Basins/ Dry Wells

On a regular basis the inlet pipe and outlet pipe and dry wells shall be checked for debris and removed as necessary to ensure unobstructed flow of water. Inspections shall occur at least twice annually, once in the fall and then in the spring after the snow melts. Inspections shall verify the tees are secure and free flowing. Depth of sediment below water line. Basins are to be cleaned whenever sediment and hydrocarbons are observed.

Basins shall be cleaned using a vacuum pump. All liquid shall be pumped from the sump of each basin at least once per year. All sediments and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations.

Water Quality Units

The water quality units (Contech) have been designed with drain manholes at grade to aid in the removal of sediment and debris accumulating in the structure and inspection ports to monitor the accumulation of sediment. Preventative maintenance shall be performed in accordance with manufacturer's instructions, which is enclosed in this section. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections. Refer to the enclosed "CDS Inspection and Maintenance Guide".

Subsurface Infiltration System

The subsurface system (Stormtech) has been designed with drain manholes at grade to aid in the removal of sediment and debris accumulating in the structure and inspection ports to monitor the accumulation of sediment. Preventative maintenance shall be performed in accordance with manufacturer's instructions. Inspection should occur monthly during the first year following installation, and then twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections.

NON-STRUCTURAL BMPs

Pavement Sweeping

As street sweeping is a BMP under DEP guidelines, this non-structural BMP is an effective removal of Total Suspended Solids (TSS) in a comprehensive stormwater management program. Litter and debris are to be regularly picked up and removed from the pavement. Paved areas are to be swept a minimum of quarterly per year.

Pervious Areas and Slopes

Runoff from pervious areas and slopes shall be directed over vegetated areas to promote settlement of suspended solids. Steep pervious slopes will be permanently vegetated to dissipate energy and reduce potential erosion. No constructed vegetated slopes should exceed 2H:1V. Slopes exceeding 2:1 shall be stabilized with riprap, jute netting or other similar measures to minimize the potential for future erosion.

Drainage Control Structures and Swales

Basin control structures and swales shall be inspected and any debris or growth surrounding or within these structures shall be removed. Any/all debris or vegetation encroaching on the control structures our outfall components shall be removed or

appropriately trimmed back to maintain the designed control elevation and flow patterns/cross section without impediment. Inspection should occur twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

Pest and Insect Control

- As a first-line defense against pests/insects and weeds (the "First-Line Defense"), the party responsible for maintenance shall avoid the use of non-organic pesticides, herbicides, fungicides and insecticides unless spot treatment is required for a specific control application. The owner shall not be required to undertake extraordinary measures or incur unreasonable cost to locate, purchase or apply non-organic products.

- If the First-Line Defense fails, as determined by the owner or party responsible for maintenance, in its sole but reasonable discretion, non-organic approaches to pest/insect control may be used, the same to be applied by a professional licensed in the Commonwealth of Massachusetts, where required. But in no event shall such non-organic approaches be used within the 25ft. buffer zone to the wetlands.

Waste Management

Solid waste and recycling will be contained in dumpsters (shown on the plan) maintained by the funeral home for routine and regular trash pickup. Waste deposition in the dumpsters will be consistent with state and local regulations.

Snow Removal

Deicing compounds must be stored or sheltered on impervious pads (i.e. in garages or maintenance room). Snow that is plowed from the paved parking surfaces shall be plowed to the edges of the pavement. Refer to landscape plan for designated snow storage areas. When capacity of these areas is exceeded, accumulated snow shall be removed.

Trash Pickup

Trash will be picked up by a garbage truck in the standard dumpsters required by the local trash company.

Hazardous Waste and Spill Control Containment

In the event of a discharge or spill of oil or another hazardous material, outlets to stormwater management facilities immediately downstream of the spill shall be plugged so that hazardous materials do not enter the system. In the event of a discharge of oil or other hazardous material, responsible facility personnel shall notify

the appropriate state agencies, the Town of Weymouth DPW and the EPA National Response Center 1-800-424-8802 shall be notified. All hazardous waste materials will be disposed of in a manner specified by local, state and/or federal regulations and by the manufacturer of such products.

Stormwater BMP Inspection and Maintenance Log

Facility Name	
Address	
Begin Date	End Date

Date	BMP ID#	BMP Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

Instructions: Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the annual independent inspectors' report to the municipality and start a new log at that time.

BMP ID# — Always use ID# from the Operation and Maintenance Manual.

Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.

Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.

Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.

Comments and actions taken — Describe any maintenance done and need for follow-up.

Stormwater BMP Inspection Matrix

Conventional & LID Best Management Practices	**Inspection & Maint. Frequency**	**Erosion& Scour**	**Obstructions**	**Trash & Debris**	**Sediment Build-Up Removal**	**Vegetation Cover**	**Remove/Reset Filter Fabric & Stone As Required**	**Vac Truck Sediment & Contaminants**	**Remove/Reset Riprap as Required**
Deep Hooded Catch Basins	Twice-Annually (Spring and Fall)								
Dry Wells	Twice-Annually (Spring and Fall)								
Pavement	Twice-Annually (Spring and Fall)								
Drainage Swales	Twice-Annually (Spring and Fall)								
Outlet Structure	Twice-Annually (Spring and Fall)								
Underground Infiltration Basin	Twice-Annually (Spring and Fall)								
Emergency Overflows	Twice-Annually (Spring and Fall)								
Outlets (Catch Basins)	Twice-Annually (Spring and Fall)								

CONTECH®
CONSTRUCTION PRODUCTS INC.

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	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	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

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.

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CONTECH® CONSTRUCTION PRODUCTS INC.
800.925.5240
contechstormwater.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 eighteen inches 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.

SECTION 6 – SOILS TESTING DATA

Map Scale: 1:1,580 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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land, 0 to 15 percent slopes	1.4	16.2%
623C	Woodbridge-Urban land complex, 3 to 15 percent slopes	4.4	50.7%
628C	Canton-Urban land complex, 3 to 15 percent slopes	2.9	33.1%
Totals for Area of Interest		**8.7**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

628C—Canton-Urban land complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: vktb
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 70 percent
Urban land: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Ice-contact slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over loose sandy and gravelly ablation till

Typical profile

H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 18 inches: fine sandy loam
H3 - 18 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A

Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Urban Land

Setting
Parent material: Excavated and filled land

Minor Components

Montauk
Percent of map unit: 4 percent
Hydric soil rating: No

Scituate
Percent of map unit: 2 percent
Hydric soil rating: No

Charlton
Percent of map unit: 2 percent
Hydric soil rating: No

Udorthents
Percent of map unit: 2 percent
Hydric soil rating: Unranked

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

623C—Woodbridge-Urban land complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w68b
Elevation: 0 to 550 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge and similar soils: 58 percent
Urban land: 28 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Paxton

Percent of map unit: 9 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 5 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Data Source Information

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

13V/0/N/3

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 20-01 (Hole #) | 11/24/20 (Date) | 7:30 AM (Time) | CLEAR SUNNY (Weather) | Latitude | Longitude:

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | Vegetation: WOODED | Surface Stones (e.g., cobbles, stones, boulders, etc.): Yes | Slope (%): 0-3

Description of Location: WOODED PORTION OF DEVELOPED LOT

2. Soil Parent Material: _____ | Landform: _____ | Position on Landscape (SU, SH, BS, FS, TS): _____

3. Distances from: Open Water Body >100 feet | Drainage Way >50 feet | Wetlands >100 feet
Property Line 710 feet | Drinking Water Well >100 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16"	A	LS	10 YR 3/2	—	—	—	—	—	GRANULAR AAA	FR	
16-32"	B	LS	10 YR 5/6	—	—	—	—	—	MASSIVE	FR	
32-52"	BC	LS	10 YR 4/4	—	—	—	—	—	MASSIVE	FR	
52-156"	C1	SAND	2.5 Y 6/2	—	—	—	15%	20%	SG	FRA	LOOSE (FIRM IN PLACE, FR. IS LOOSE TO HAND)
	CONSISTENT AND STRUCTURE. TEST PIT WAS HAD RAIN	DOWN TO VERY DRY BEFORE.	BOTTOM OF HOLE W/MATERIAL @ HIGHEST POINT OF LOT.	NO MOTTLES OBSERVED / WEEPING OBSERVED CONSIDERING		NO			LARGE BOULDERS ARE IN HOLE. COULD NOT HANDS WERE	PRESENT MAKE BALL IN HAND BY STAINED BY FIELD TEST	

Additional Notes:
BONY C LAYER, EXCAVATOR HAD SOME DIFFICULTY. VERY BONY / COMPACTED. TOUGH TO DIG THROUGH C LAYER
C1 = SAND BASED ON FIELD TEST. DOES CONTAIN FINES, TOUGH TO EXCAVATE THROUGH
MODERATE STAINING OF HANDS. VERY DRY → DID RAIN YESTERDAY

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area*)

Deep Observation Hole Number: 20-02 (Hole #) | 11/24/20 (Date) | 8:15 (Time) | Sunny Clear (Weather) | Latitude | Longitude:

1. Land Use: Commercial (e.g., woodland, agricultural field, vacant lot, etc.) | Wooded (Vegetation) | Yes (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | Slope (%)

   Description of Location: SEE LOG 20-01

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet | Drainage Way >50 feet | Wetlands >100 feet | Property Line 710 feet | Drinking Water Well >100 feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16"	A	LS	10YR 3/2	—	—	—	—	—	GRAN/FR		
16-30"	B	LS	10YR 5/6	—	—	—	—	—	MASSIVE/FR		
30"-72"	BC	LS	10YR 4/4	—	—	—	—	—	MASSIVE/FR		
72"-120"	C	SAND	2.5 Y 6/2	120"	10YR 7/6	5%	20%	20%	SG/LOOSE		LENSES ALL AROUND HOLE OF FAINT ORANGE COLOR. (POTENTIAL MOTTLES HARD TO TELL IN SANDY MATERIAL) SPOTTY ALL AROUND HOLE
	MATERIAL IS DRY / NO WATER OBSERVED.										
	FAINT ORANGE MATERIAL CONSISTENT DOWN FROM 10' on.										

Additional Notes:
ABOUT 40" DOWN SOME RESISTANCE TO EXCAVATION. NOT AS DIFFICULT TO EXCAVATE AS FIRST HOLE. C LAYER LOOKS A LITTLE MORE COMPACT THE DEEPER YOU GO.

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 20-03 (Hole #) | 11/24/20 (Date) | 8:50 AM (Time) | Sunny / CLEAR (Weather) | Latitude | Longitude:

1. Land Use: Commercial (e.g., woodland, agricultural field, vacant lot, etc.) | Vegetation: WOODED | Surface Stones (e.g., cobbles, stones, boulders, etc.): 4% | Slope (%): 0-3

Description of Location: See 20-01

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet | Drainage Way >50 feet | Wetlands >100 feet | Property Line 210 feet | Drinking Water Well >100 feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-44"	FILL										
44"-144"	C	SAND	2.5Y 6/2	132"	10YR 7/6	2%	25%	25%	SG LOOSE	DRY	
DOES	CONTAIN	SOME FINES / UNABLE	TO MAKE	BALL	IN	HAND	DURING	FIELD	TEST.		
FAINT	ORANGE	SOIL	ABOUT	11"	FEET	DOWN	SIMILAR	TO TH	20-02.	VERY	CONSISTENT SOIL
GOING	DOWN	TO	BOTTOM	OF	HOLE	AFTER	FILL.	POTENTIAL	MOTTLES	@	132".

Additional Notes: FILL - LOAM W/TRASH SOME CONC BLOCKS AT SURFACE TO ALMOST 4' DOWN

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 20-04 (Hole #) | 12/2/20 (Date) | 7:00 AM (Time) | CLEAR (Weather) | — (Latitude) | — (Longitude:)

1. Land Use: FUNERAL HOME/ COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | YES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | — (Slope (%))

Description of Location: —

2. Soil Parent Material: — | Landform: — | Position on Landscape (SU, SH, BS, FS, TS): —

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line 710 feet | Drinking Water Well >100 feet | Other — feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth Weeping from Pit | — Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48"	FILL	—	—	—	—	—	—	—	—	—	—
48"-150"	C_1	2.5Y 6/2	SAND	—	—	—	10	15	SG LOOSE		VERY CLOSE TO L.S.F. SAND
NOT A COARSE MATERIAL. FINE SAND IN HAND W/ MATERIAL											
BOULDERS IN MATERIAL. SOME FINES IN SAND. RELATIVELY DRY CONSIDERING PAST RAIN. VERY CONSISTENT ALL THE WAY DOWN THE HOLE.											
TOP MATERIAL THAT WAS DISTURBED DOES LOOK MORE COARSE THAN OTHER TEST PITS											
DID NOT SEE ANY SIGNS OF MOTTLES / WEEPING WATER											
*APPEARS THEY CAME AND DUG A LITTLE BIT (PROBABLY THE DAY THEY CALLED) AND THATS WHY TOP IS FILL?											

Additional Notes:
HEAVY RAINS 11/30/20 FORECAST SOME RAIN 12/1/20.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 20-C6 (Hole #) | 12/2/20 (Date) | 7:45 AM (Time) | CLEAR (Weather) | Latitude | Longitude:

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | Vegetation: WOODED | Surface Stones (e.g., cobbles, stones, boulders, etc.): YES | Slope (%): 0-3

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >10 feet | Drinking Water Well >100 feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth Weeping from Pit — Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14"	A	LS	10 YR 3/2						GRANULAR FR		
14"-26"	B	LS	10 YR 5/6						MASSIVE FR		VERY THIN LAYER OF B
26"-150"	C1	SAND	[illegible]	2.5Y	5/3		15	15	SG LOOSE		MORE COARSE THAN C2 - LITTLE DARKER
			NO MOTTLING OBSERVED / DARKER SOIL BUT						CONSISTENT ALL		THE WAY DOWN
[illegible] TRANSITION			SIMILAR TO OTHER TEST PIT MATERIAL BUT MORE COARSE. DOES CONTAIN BOULDERS / GRAVEL								
	DID NOT SEE ANY WATER IN BOTH ROADWAYS ARE LOWER			HOLE. SOIL DRAINS WELL BUT ALSO THAN TEST PITS.					A HIGH	POINT	OF SITE.

Additional Notes:
NOT TO DIFFICULT TO EXCAVATE / JUST SOME BOULDERS

ON ROAD - STANDING WATER RIGHT IN FRONT OF TEST PIT. LOOKS TO BE ROADWAY LOW POINT. NO DRAINAGE ON ROAD. NO OUTLET OBSERVED. TO BE NOTED.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 20-06 (Hole #) | 12/2/20 (Date) | (Time) | CLEAR (Weather) | – (Latitude) | – (Longitude)

1. Land Use: RESIDENTIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | Y (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3 (Slope (%))

Description of Location: TRAIL RIGHT OFF DRIVEWAY @ RESIDENTIAL HOUSE ON CYPRESS.

2. Soil Parent Material: | (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >50 feet | Wetlands >100 feet | Property Line >10 feet | Drinking Water Well >100 feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth Weeping from Pit ____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	A	LS	10 YR 3/2	—	—	—			GR. FR		GR. FR
12"-24"	B	LS	10 YR 5/8	—	—	—			MASSIVE	FR.	MASSIVE, FR
24"-66"	C_1	SAND	10 YR 4/4	—	—	—	15	3	SG LOOSE		SG LOOSE
66"-120"	C_2	SAND	2.5Y 5/3	—	—	—	15	0	SG. LOOSE		TOOK SOIL SAMPLE SG LOOSE
	BOTH C_1 AND C_2 ARE FORM IN PLACE (TIGHT COMPACTED) LOOSE ONCE EXCAVATED										
	MORE COARSE THAN SOIL UP ON HIGHER GL SITE STILL GRAVELLY				COLOR IS MORE DARK YG OR MANY LARGE STONES						
	NO WATER OR MOTTLING OBSERVED IN PIT. ABLE TO EXCAVATE TO 10'										

Additional Notes:
TEST PITS C/T AT LOW POINTS OF SITE. POCKETS OF BOULDERS MAKING EXCAVATION MORE DIFFICULT

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 2-09 (Hole #) | 12/2/20 (Date) | 10:00 (Time) | Sunny Some Clouds (Weather) | — (Latitude) | — (Longitude:)

1. Land Use: Residential (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | Yes (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3 (Slope (%))

   Description of Location: Residential House, Due to Front Yard

2. Soil Parent Material: _____ | Landform: _____ | TS? (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >50 feet | Wetlands >100 feet | Property Line >10 feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-56"	Fill – Side of test closest to utilities										
56"-76"	C_1	Sand	10 YR 5/3	—	—	—	20	20	Sg. Loose	Firm in Place	
76"-120"	C_2	Sand	2.5 Y 6/2				20	20	Sg. Loose	Firm in Place	
	Coarse	Good sand, compacted/firm in place, no water or mottles present in the hole.									
* Depths taken based on side w/ fill. Most coarse material of the 7 test pits											

Additional Notes:

Several large rocks (small boulders @ top of test pit for. i.e. 1st few feet)
Excavated closer to driveway to make sure sewer service was avoided.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-100 (Hole #) 8-22-22 (Date) 7:30AM (Time) overcast (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Oaks (Vegetation) _____ (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-2% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet; Drainage Way _____ feet; Wetlands _____ feet; Property Line _____ feet; Drinking Water Well _____ feet; Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0"-12"	A/B	Loam	7.5YR 2.5/2	–	–	–			Friable		
12"-48"	C1	Loamy sand	7.5YR 5/4	–	–	–			Friable		
48"-120"	C2	Sand w/ Fines	7.5YR 5/4	–	–	–		5%	Friable/ Loose		

Additional Notes: _____

Briggs Engineering & Testing
A Division of PK Associates, Inc.

December 29, 2020

Crocker Design Group
2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32133	- #10 Fraction	TP4

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	87
0.425 mm	#40	73
0.180 mm	#80	50
0.150 mm	#100	44
0.053 mm	#270	23
0.0373 mm		21
0.0241 mm		15
0.0142 mm		9
0.0101 mm		7
0.0072 mm		4
0.0036 mm		2
0.0015 mm		1

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

Respectfully Submitted,

BRIGGS ENGINEERING & TESTING
A Division of PK Associates, Inc.

Sean Skorohod
Director of Testing Services
Construction Technology Division

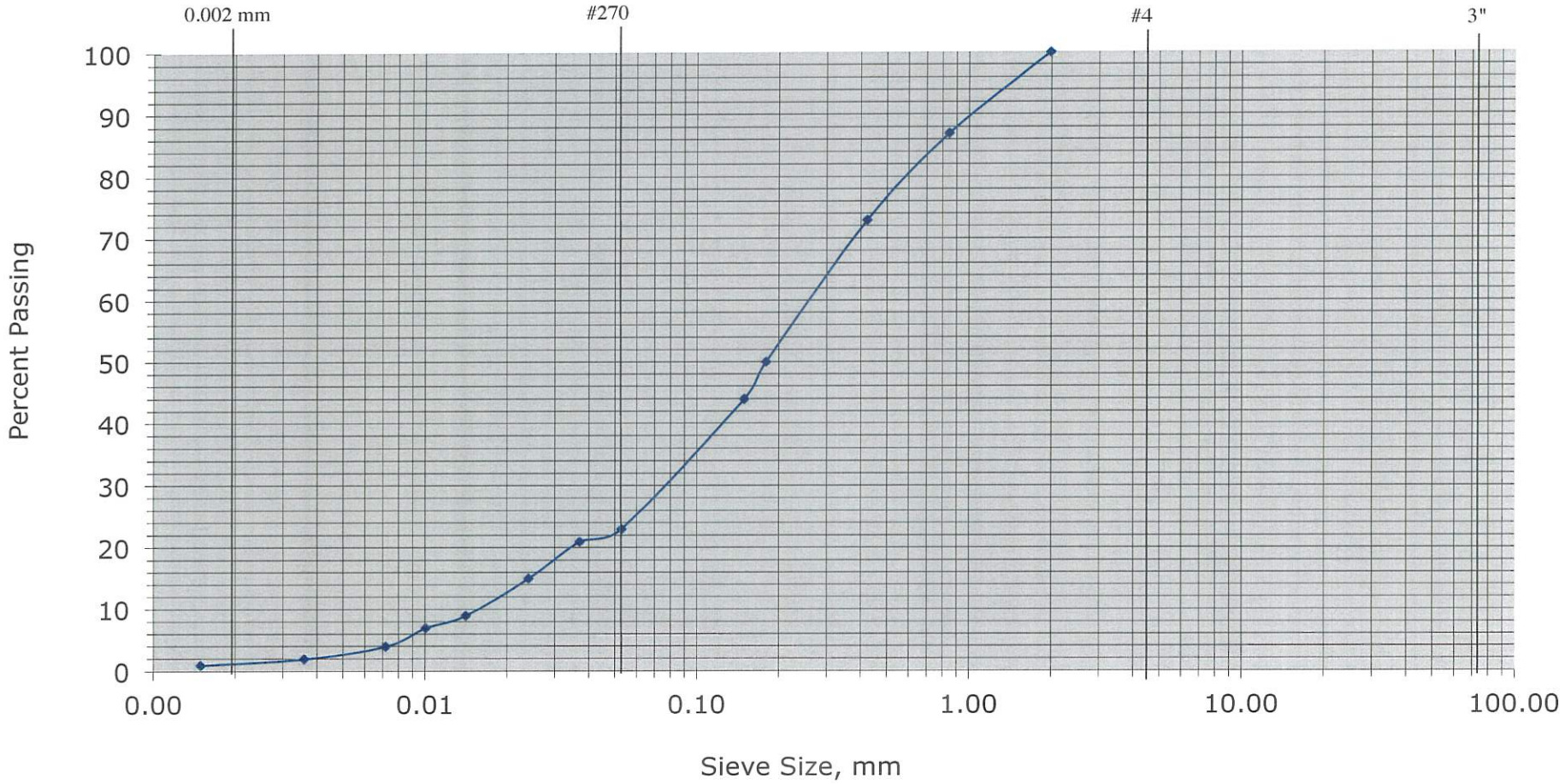
enclosures: graph

Briggs Engineering & Testing

A Division of PK Associates, Inc.

Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32133

Particle Size Analysis



Note: The illustrated graph represents the sand fraction only as defined by D.E.P. policy# BRP/DWM/PeP-P00-1, Appendix 2.

Briggs Engineering & Testing
A Division of PK Associates, Inc.

December 29, 2020

Crocker Design Group
2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32134	- #10 Fraction	TP4

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	88
0.425 mm	#40	74
0.180 mm	#80	52
0.150 mm	#100	46
0.053 mm	#270	24
0.0377 mm		18
0.0242 mm		13
0.0141 mm		10
0.0101 mm		9
0.0072 mm		6
0.0036 mm		5
0.0015 mm		4

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

Respectfully Submitted,

BRIGGS ENGINEERING & TESTING
A Division of PK Associates, Inc.

Sean Skorohod
Director of Testing Services
Construction Technology Division

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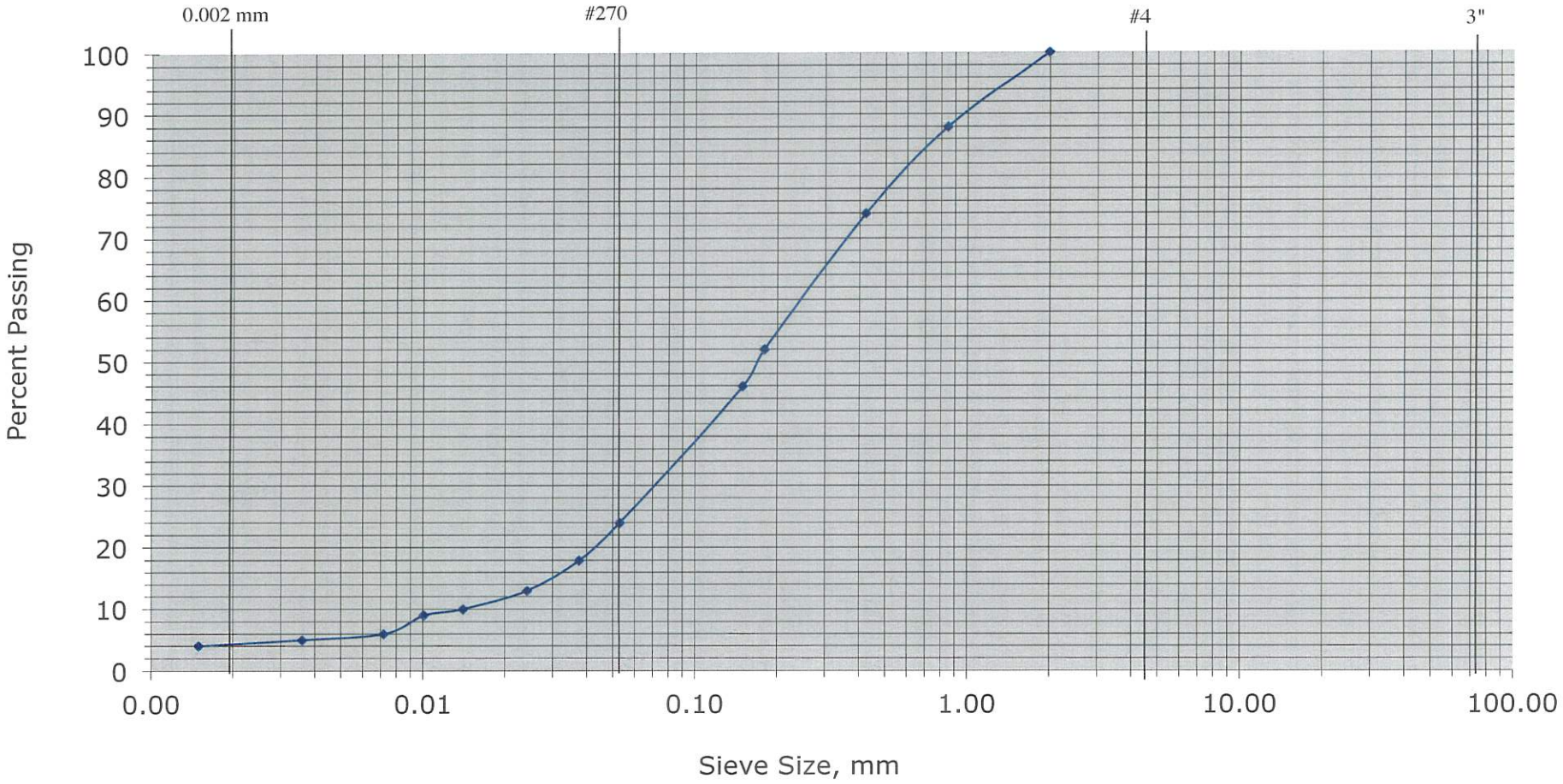
A Division of PK Associates, Inc.

Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32134

Particle Size Analysis



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December 29, 2020

Crocker Design Group
2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32135	- #10 Fraction	TP6

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	86
0.425 mm	#40	70
0.180 mm	#80	48
0.150 mm	#100	42
0.053 mm	#270	25
0.0367 mm		24
0.0238 mm		18
0.0139 mm		15
0.0100 mm		12
0.0071 mm		9
0.0035 mm		8
0.0015 mm		6

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

Respectfully Submitted,

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A Division of PK Associates, Inc.

Sean Skorohod
Director of Testing Services
Construction Technology Division

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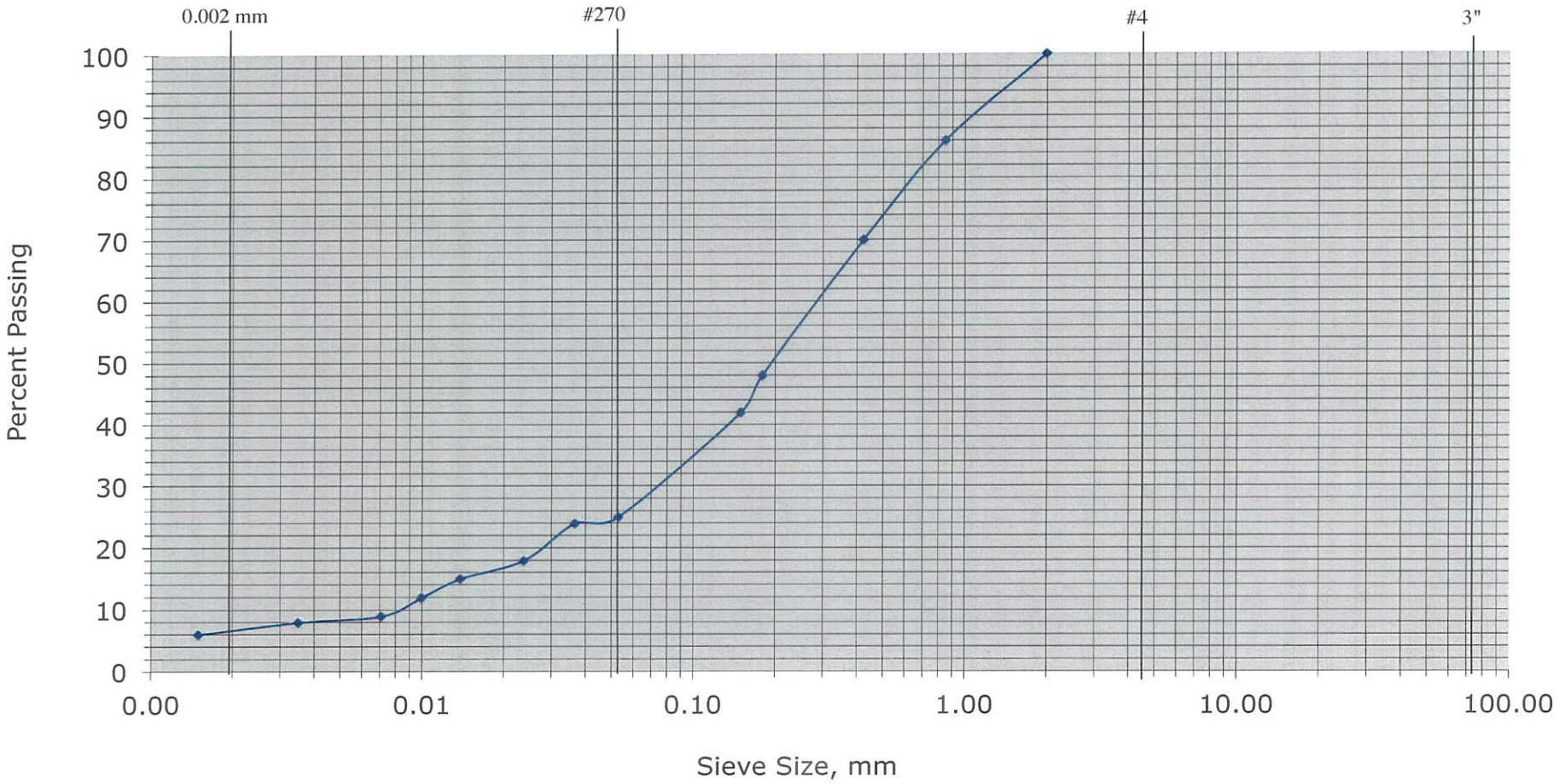
A Division of PK Associates, Inc.

Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32135

Particle Size Analysis



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December 29, 2020

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2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32136	- #10 Fraction	TP6

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	84
0.425 mm	#40	67
0.180 mm	#80	43
0.150 mm	#100	37
0.053 mm	#270	21
0.0374 mm		19
0.0242 mm		13
0.0141 mm		10
0.0101 mm		9
0.0071 mm		7
0.0036 mm		5
0.0015 mm		4

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Director of Testing Services
Construction Technology Division

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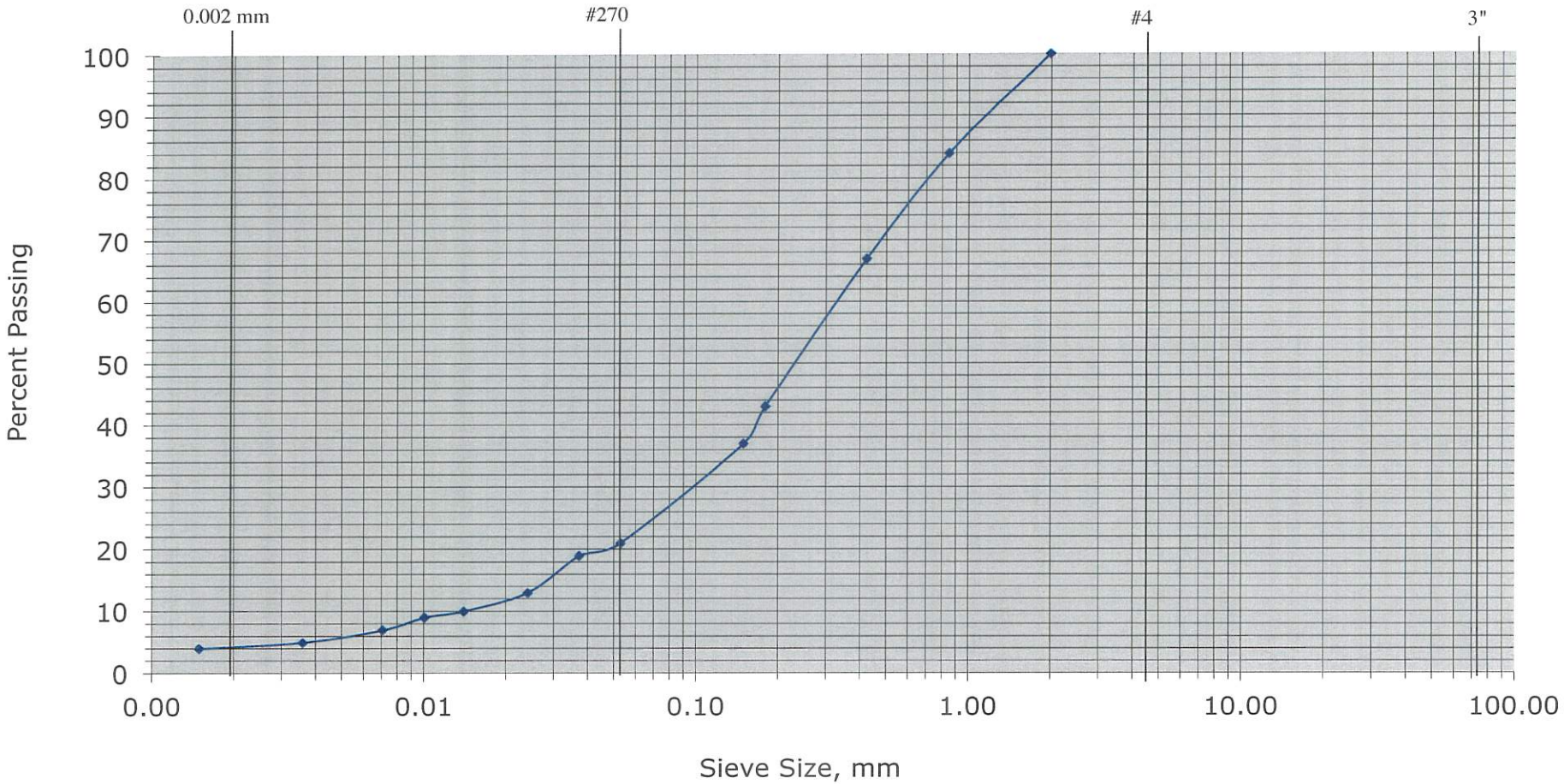
Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32136

Particle Size Analysis



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2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32137	- #10 Fraction	TP7

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	88
0.425 mm	#40	70
0.180 mm	#80	44
0.150 mm	#100	39
0.053 mm	#270	17
0.0374 mm		16
0.0244 mm		12
0.0142 mm		9
0.0101 mm		9
0.0071 mm		7
0.0035 mm		4
0.0015 mm		4

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

Respectfully Submitted,

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Construction Technology Division

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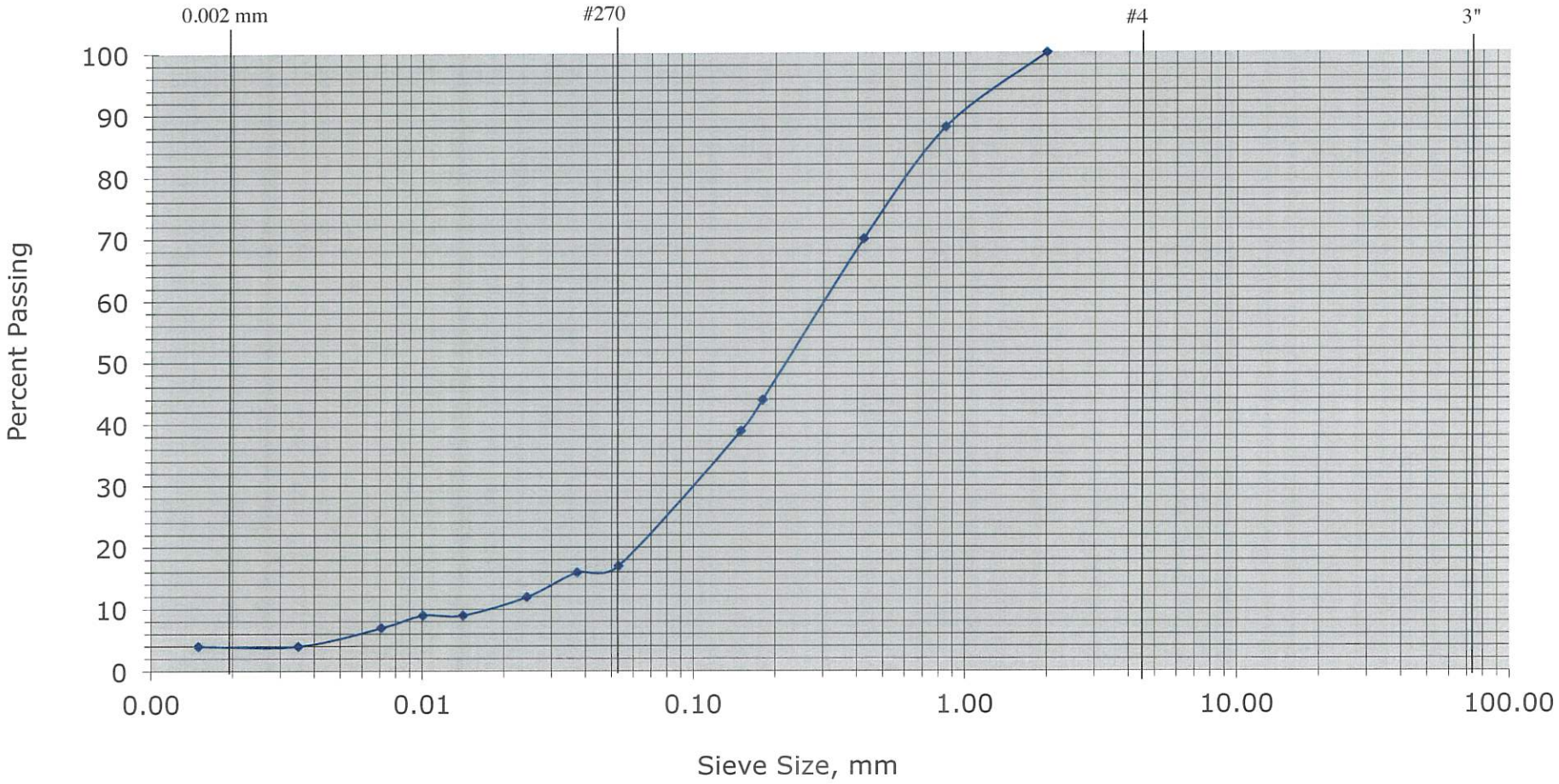
Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32137

Particle Size Analysis



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December 29, 2020

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2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32138	- #10 Fraction	TP7

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	87
0.425 mm	#40	72
0.180 mm	#80	50
0.150 mm	#100	45
0.053 mm	#270	28
0.0367 mm		24
0.0238 mm		18
0.0141 mm		12
0.0100 mm		10
0.0071 mm		7
0.0035 mm		3
0.0015 mm		3

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

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Construction Technology Division

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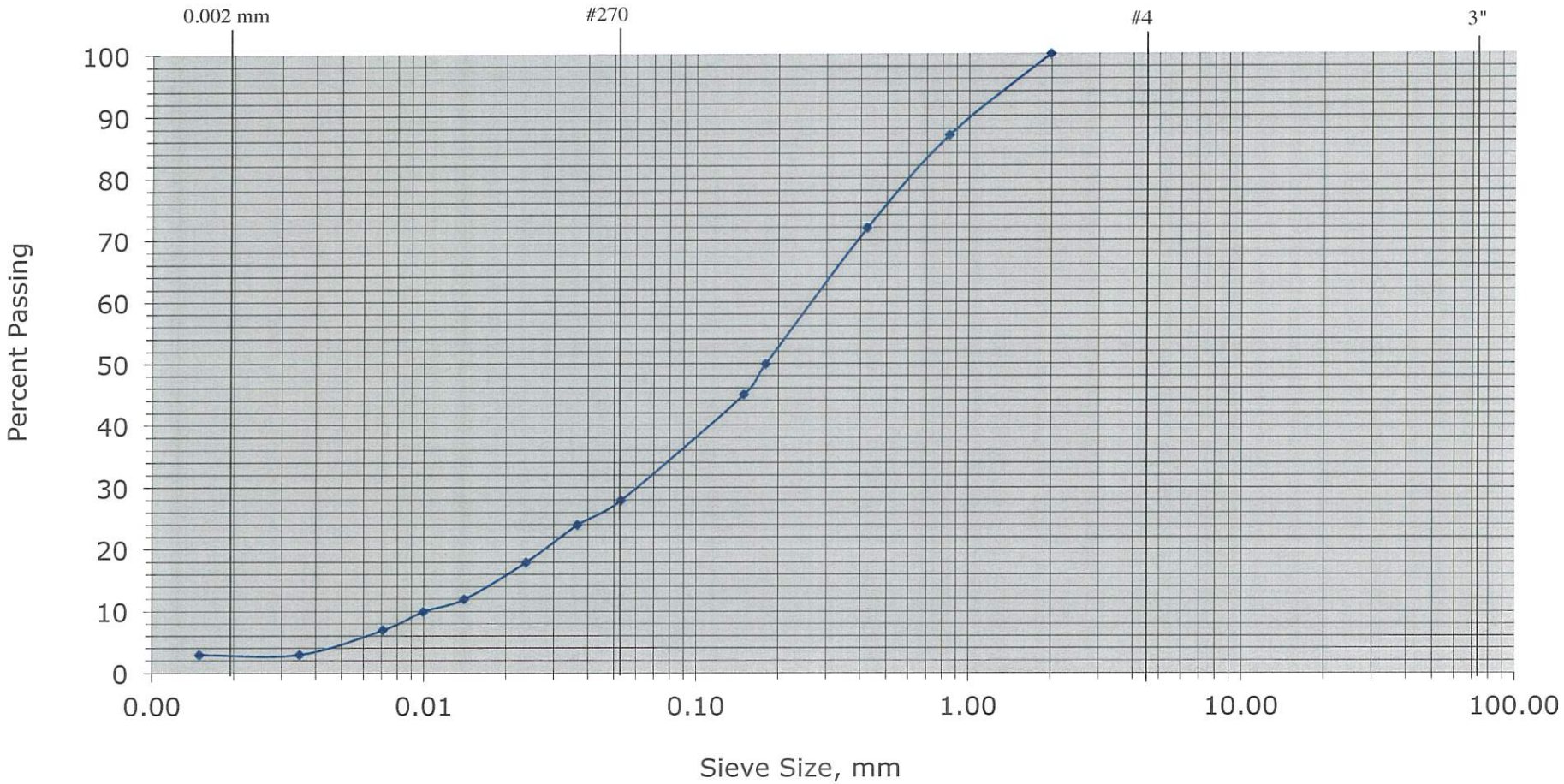
Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32138

Particle Size Analysis



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2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32139	- #10 Fraction	TP7

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	85
0.425 mm	#40	66
0.180 mm	#80	36
0.150 mm	#100	29
0.053 mm	#270	13
0.0386 mm		12
0.0246 mm		9
0.0143 mm		7
0.0102 mm		6
0.0072 mm		4
0.0035 mm		4
0.0015 mm		3

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

Respectfully Submitted,

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Construction Technology Division

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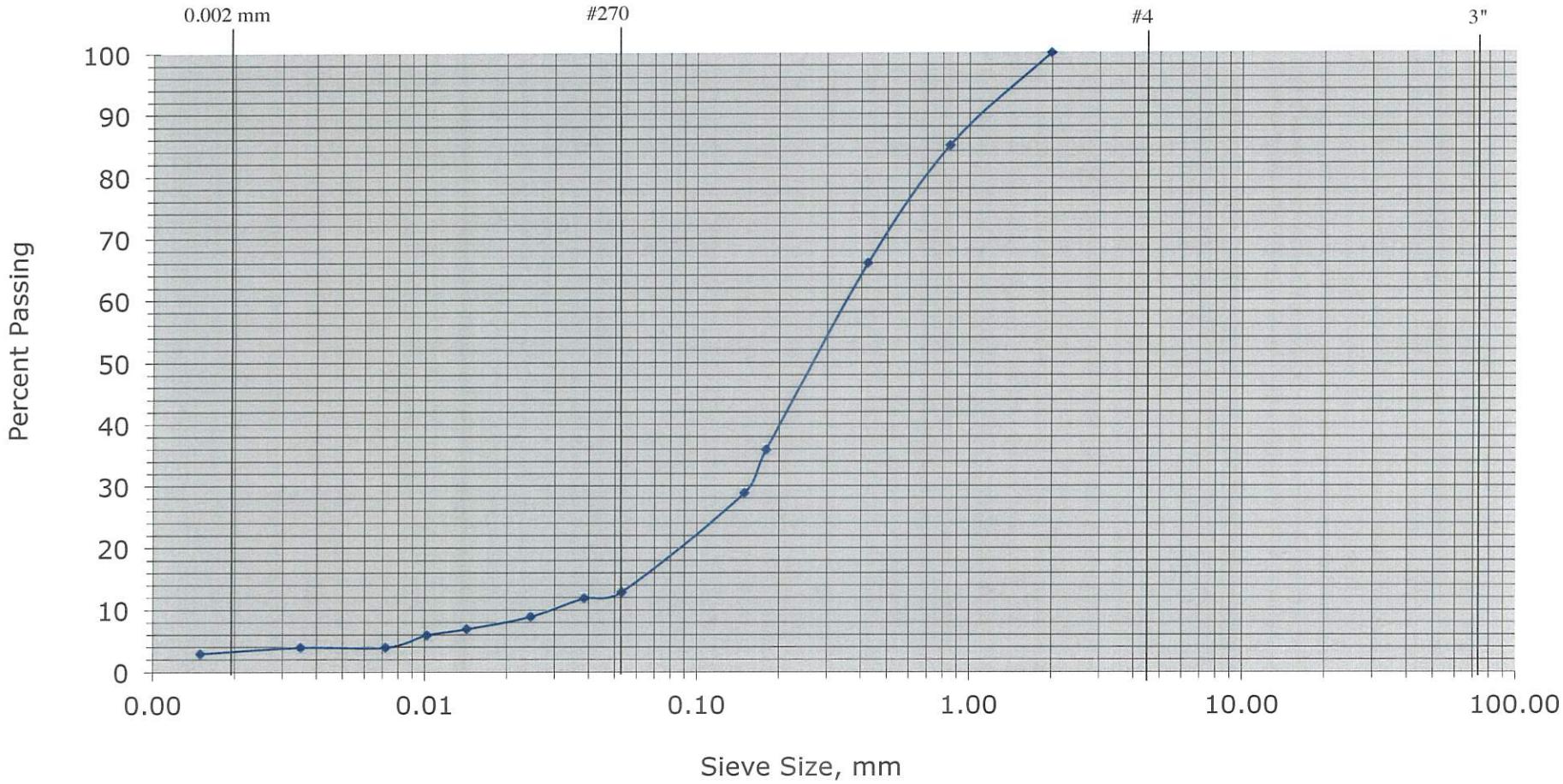
A Division of PK Associates, Inc.

Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32139

Particle Size Analysis



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Briggs Engineering & Testing
A Division of PK Associates, Inc.

December 29, 2020

Crocker Design Group
2 Sharp Street
Hingham, MA 02043

Attn: Ms. Taylor Cursano

Title V Soil Analysis

Address: MK Funeral Home
Briggs # 31074
Tested: 12/24/20

1.	Lab Ref. No.	Description	Source
	M-32140	- #10 Fraction	TP7

2. Particle Size Analysis {ASTM D 422}:

Sieve Size		Results
Standard	Alternate	{% Passing by Wt.}
2.0 mm	#10	100
0.850 mm	#20	86
0.425 mm	#40	68
0.180 mm	#80	40
0.150 mm	#100	34
0.053 mm	#270	15
0.0387 mm		10
0.0246 mm		9
0.0143 mm		7
0.0102 mm		6
0.0072 mm		3
0.0035 mm		1
0.0015 mm		1

3. The above analysis was performed in accordance with D.E.P. policy# BRP/DWM/PeP-001-1, Appendix 2.

Respectfully Submitted,

BRIGGS ENGINEERING & TESTING
A Division of PK Associates, Inc.

Sean Skorohod
Director of Testing Services
Construction Technology Division

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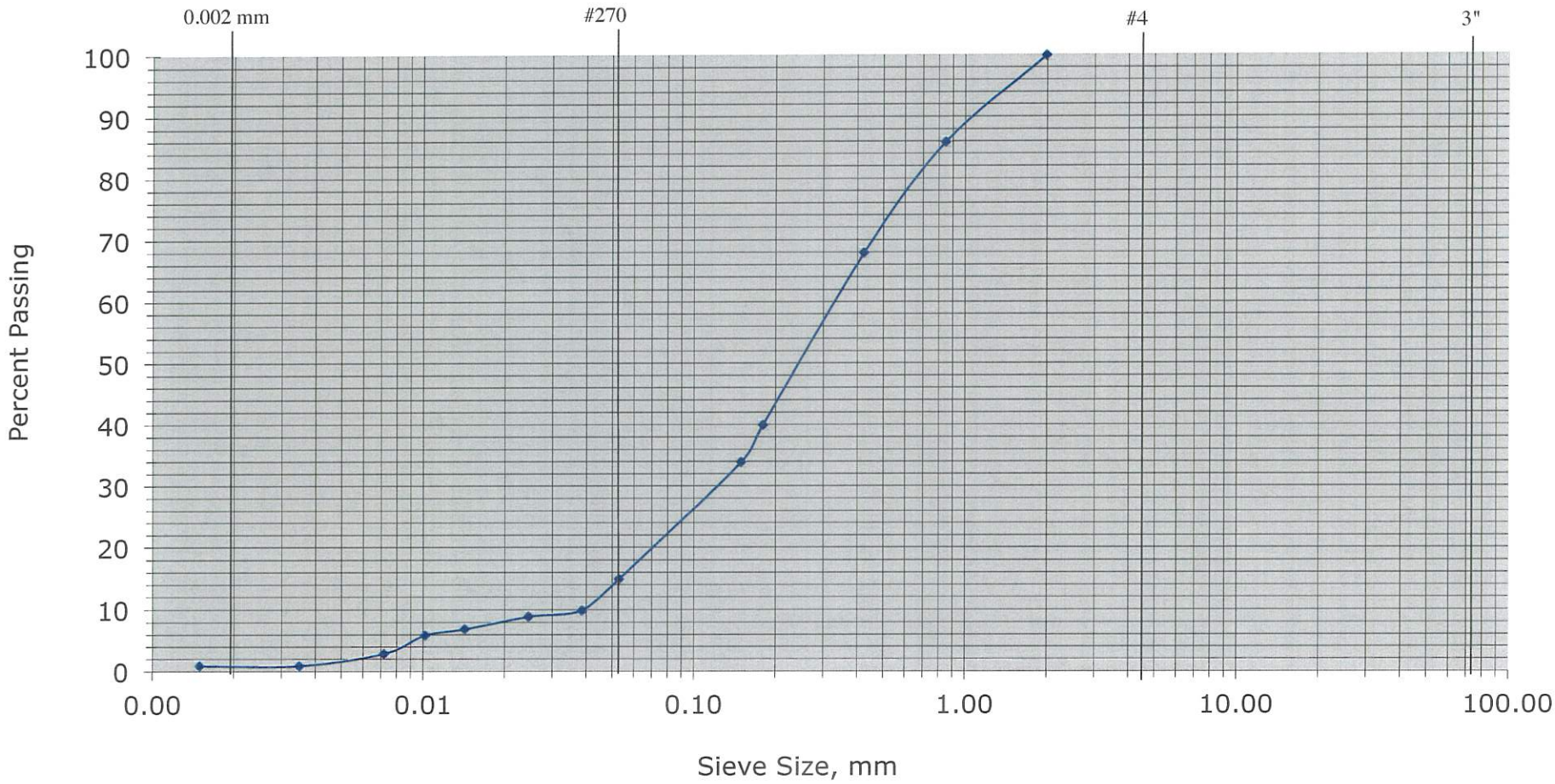
Briggs Engineering & Testing

A Division of PK Associates, Inc.

Project:	MK Funeral Home
Date Tested:	12/24/20
Lab Ref. No.:	M-32140

Particle Size Analysis



Note: The illustrated graph represents the sand fraction only as defined by D.E.P. policy# BRP/DWM/PeP-P00-1, Appendix 2.

SECTION 7 – HYDRAULIC PIPE SIZING

STORM DRAIN DESIGN

Design Assumptions

Project No. 100-060
Project Mcdonald-Keohane Funeral Home
Location Weymouth, MA

25 Year Storm
24 Hour Duration
Pipe Coefficient "n" 0.013 HDPE

COMPUTED BY CRM DATE 4/8/2022
REVISED CRM DATE 10/5/2022
CHECKED BY DATE

DRAINAGE STURCTURE		TRIBUTRARY AREA		RUNOFF COEFFICIENT	RUNOFF						PIPE								FROM STRUCTURE
FROM	TO	INCREMENTAL				TIME OF FLOW		RAINFALL INTENSITY	DISCHARGE (Q)								FROM	TO	
STA STRUCT.	STRUCT.	(AC)	TOTAL	"C"	"C" X "A"	TC(MIN)	TF(MIN)	(IN/HR)	INCREM	TOTAL	LENGTH	DIA	SLOPE	Q	VF	VR	INVERT	INVERT	RIM
CB1A	DMH1B	0.12	0.12	0.81	0.10	5		6.25	0.61	0.61	74.62	12	0.009	3.31	4.21		182.95	182.31	186.45
CB1C	DMH1B	0.13	0.13	0.88	0.11	5		6.25	0.69	0.69	4	12	0.050	7.98	10.17		185.05	184.85	188.55
DMH1B	DMH1D	0.25	0.25	0.85	0.21		5	6.25	1.30	1.30	15.52	12	0.005	2.40	3.05		182.21	182.14	189.00
DMH1D	WQU1	0.25	0.25	0.85	0.21		5	6.25	1.30	1.30	33.94	12	0.010	3.52	4.48		182.04	181.71	189.02
CB1F	DMH1E	0.05	0.05	0.90	0.05	5		6.25	0.29	0.29	23.9	12	0.061	8.82	11.24		186.57	185.11	190.07
DMH1E	WQU1	0.05	0.05	0.90	0.05		5	6.25	0.29	0.29	40.36	12	0.010	3.55	4.53		182.11	181.71	190.00
WQU1	MANIFOLD	0.30	0.30	0.87	0.26		5	6.25	1.63	1.63	21.38	12	0.005	2.56	3.26		181.71	181.6	189.44
Trench	CB3A	0.03	0.03	0.84	0.03	5		6.25	0.17	0.17	5.38	8	0.100	3.83	10.99		184.64	184.10	186.66
CB3A	WQU2	0.03	0.03	0.84	0.03		5	6.25	0.17	0.17	5.67	12	0.011	3.67	4.68		182.54	182.48	187.02
CB3B	WQU2	0.18	0.18	0.72	0.13	5		6.25	0.81	0.81	2.5	12	0.012	3.91	4.98		182.51	182.48	186.62
WQU2	DMH3C	0.21	0.21	0.78	0.16		5	6.25	1.03	1.03	2.5	12	0.012	3.91	4.98		182.48	182.45	187
DMH3C	DMH3D	0.21	0.21	0.78	0.16		5	6.25	1.03	1.03	52.79	12	0.005	2.55	3.25		182.35	182.08	187.36
CB3E	WQU3	0.15	0.15	0.76	0.11	5		6.25	0.71	0.71	16.99	12	0.005	2.60	3.31		182.22	182.13	188.36
WQU3	DMH3D	0.15	0.15	0.76	0.11		5	6.25	0.71	0.71	8.96	12	0.006	2.67	3.40		182.13	182.08	187.87
CB3G	WQU4	0.13	0.13	0.83	0.11	5		6.25	0.69	0.69	32.23	12	0.005	2.59	3.30		185.68	185.51	189.18
WQU4	DMH3F	0.13	0.13	0.83	0.11		5	6.25	0.69	0.69	13.44	12	0.039	7.09	9.03		185.51	184.98	190.17