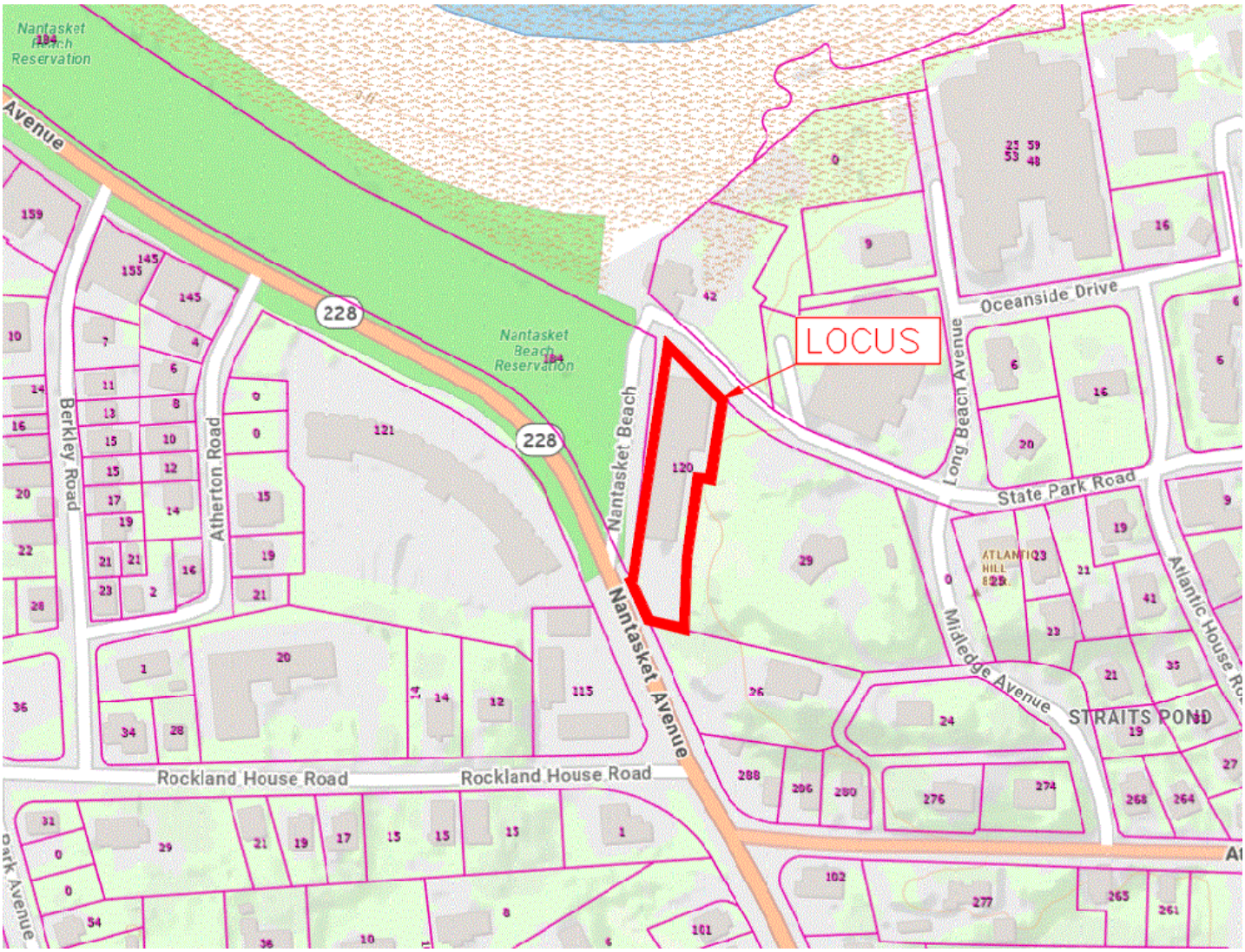
Stormwater Report

For

120 Nantasket Ave.
Map 48 Lot 1
Hull, MA



Date: December 5, 2022
By: Matthew Pike, P.E.
Checked By: Jed Hannon, P.E.
Atlantic Coast Engineering
88 Front Street, Scituate, MA 02066

Executive Summary

The project proponent proposes to construct a four-story condominium complex with basement level garage at 120 Nantasket Avenue in Hull, Massachusetts at the former site of the Atlantic Aquarium. The subject property is shown as Lot 1 on the Town of Hull Assessors Map 45 and consists of 0.5± acres of land in the Hull Rec "C" Zoning District. Redevelopment of the property will include razing of the former Atlantic Aqaurium, construction of a 4 story condominium complex with basement garage, 39 vehicle parking spaces, 55 bicycle parking spaces, and landscaping and other amenities in harmony with the Hull Waterfront. This report has been developed in accordance with the Massachusetts Stormwater Standards and is intended to be used in support of local and state permitting applications for the project.

Existing Site Description

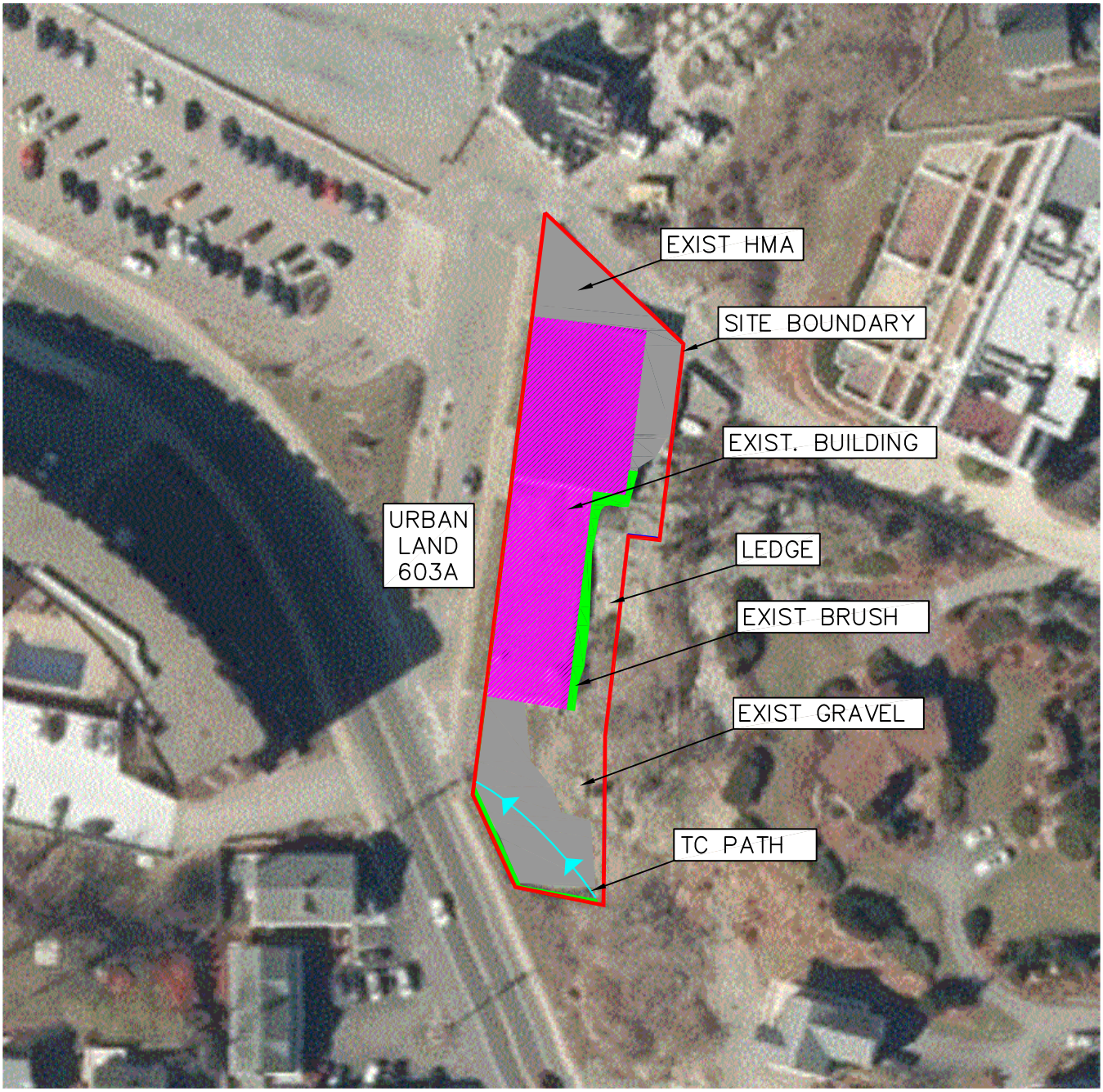
The site is currently fully developed with the former Atlantic Aquarium building and impervious paved and gravel parking areas. The existing lot has frontage and access points on Nantasket Avenue and State Park Road.

Grades on the site are highest along the ledge outcrops along the east property line. The site generally slopes from east to west. Slopes range from 2% within the developed portion of the site to 70% along the undeveloped ledge. There is an existing retaining wall along a portion of the east property line. The site has a high elevation of approximately 56 ft. (NGVD88) and a low elevation of approximately 16 ft. (NGVD88). There is no known existing stormwater infrastructure on site. The existing stormwater flow paths generally runs from east to west and terminates at the west property line.

Soils on site are classified as Urban Land (603A) as shown on United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Soil Survey. On-site borings were conducted on 8/4/22 (See appendices). Based on boring data, the depth to the seasonal high-water table is estimated at 7.5' BGS. The Urban Fill is mostly composed of sand and gravel fill, both porous and permeable materials. Based on boring data, a conservative permeability value of 2 in/hr has been estimated to calculate infiltration and drawdown of the stormwater system components. If necessary, any unsuitable material encountered beneath the stormwater system during construction, shall be removed and replaced with clean coarse sand.

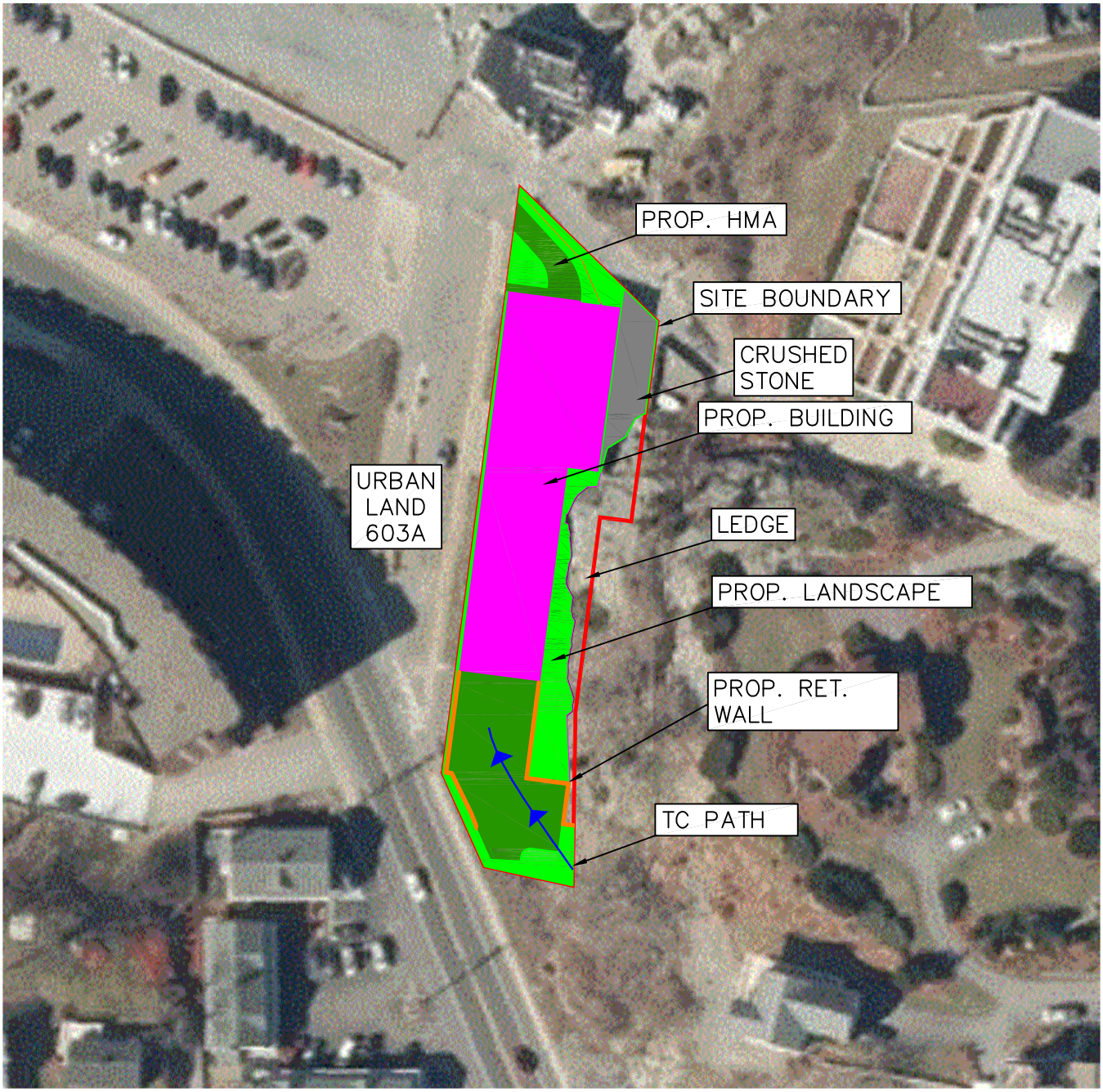
The entirety of the existing site is shown to be in a Zone X on the FEMA Federal Insurance Rate Map (FIRM) #25023C0038J, dated September 17, 2012 (See Appendices).

A summary of the site characteristics in both the existing and proposed conditions is presented in the table below.



0’ 80’ 160’ 240’

E-1	EXISTING AREAS	ATLANTIC COAST ENGINEERING		
	AT: 120 NANTASKET AVENUE	88 FRONT ST., SUITE 22, SCITUATE, MA 02066		
	HULL, MA	1" = 80'	(781)378-2593	DATE: 12/5/22



0’ 80’ 160’ 240’

P-1	PROPOSED AREAS	ATLANTIC COAST ENGINEERING		
	AT: 120 NANTASKET AVENUE	88 FRONT ST., SUITE 22, SCITUATE, MA 02066		
	HULL, MA	1" = 80'	(781)378-2593	DATE: 12/5/22

Watershed Area Summary		
	Existing	Proposed
Roof Area (sf)	9,495	9,569
Pavement (sf)	8,345	4,451
Landscape (sf)	1,053	5,572
Ledge (sf)	2,835	2,136
% Impervious	95%	74%

Operation and Maintenance Plan

The Operations and Maintenance Plan is attached, see Appendix B

Documenting Compliance

The proposed stormwater management system complies with the ten standards of the MA Department of Environmental Protection (MassDEP) Stormwater Management Standards.

This report was prepared under the direction of Jed Hannon, a Registered Professional Engineer (RPE) licensed to do business in the Commonwealth pursuant to MGL Chapter 112 Section 81R.

This section of the Stormwater Report includes the computations required to document compliance with the following standards:

- Standard 1: No new untreated discharges.
- Standard 2: Peak Rate Attenuation.
- Standard 3: Recharge.
- Standard 4: Water Quality.
- Standard 5: Land Uses with Higher Pollution Pollutant Loads (LUHPPLs).
- Standard 6: Critical Areas.
- Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable.
- Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control.
- Standard 9: Operation and Maintenance Plan.
- Standard 10: Prohibition of Illicit Discharges.

The design of the stormwater management system used the MassDEP Stormwater Handbook as a guideline. The following is a review of each of the 10 standards of the Handbook and how the project satisfies each standard.

1. No new untreated discharges

There are no new untreated discharges to the Massachusetts Bay. The parking lot runoff will be will be treated by parking lot maintenance, and trench drains directed to underground infiltration units. The roof runoff will directed to underground infiltration units via gutter downspouts and underground piping. The landscape areas will be composed of compost amended soil and runoff from those areas will flow overland.

The proposed redevelopment meets this standard.

2. Peak Rate Attenuation

The site discharges to the Massachusetts Bay which is a tidal water body and land subject to coastal storm flowage. According to the Stormwater Handbook, the requirement "can be waived for discharges to land subject to coastal storm flowage." Although a waiver of this requirement is warranted, the stormwater system was developed to reduce peak rate of discharge for the 2, 10, and 100-year - 24-hour storm events. As shown in table 1 below, post-development peak discharges rates do not exceed pre-development peak discharge rates. See attached HydroCad reports for full analysis.

Table 1 - Peak Rate of Discharge (cfs)

	Design Point	
Design Storm	**Pre-**	**Post-**
2 year, 3.3"	1.54	1.17
10 year, 4.9"	2.32	2.00
100 year, 8.5"	4.05	3.86

The proposed redevelopment meets this standard.

3. Groundwater Recharge

The project will result in a reduction in paved and impervious surface area. Therefore, the sites ability to recharge stormwater runoff will be improved through greater surface permeability. In addition to the reduction of impervious surface area, underground infiltration units will further increase groundwater recharge.

A soil analysis was provided and described previously. The proposed on-site subsurface infiltration system will meet the required recharge to groundwater per the Massachusetts Stormwater Standards.

Urban Fill soils are generally classified as HSG D soils. The required recharge volume was determined by the following formula per the Massachusetts Stormwater Standards.

For HSG D Soils:

Building Recharge = (0.10 in / 12 in/ft)(Impervious Area in sf)

= (0.10 in / 12 in/ft)(9,569 sf)
= 80 cf Required Recharge

Driveway/Parking Recharge = (0.10 in / 12 in/ft)(Impervious Area in sf)
= (0.10 in / 12 in/ft)(4,451 sf)
= 37 cf Required Recharge

The entire system volume is far greater than the required recharge volume (772 CF > 107 CF)

Drawdown within 72 hours

DEP Stormwater Standards require an analysis to show that the Required Recharge Volume will drain down in less than 72 hours in order to provide infiltration volume for subsequent rainfall events. Based on the on-site soils, permeability is estimated at 2 in/hr. This rate was used to calculate infiltration and drawdown within 72 hours. The infiltration rate of 2 in/hr, the storage volume, and the bottom area was utilized in the "Static" method formula:

Time drawdown Cultec = Rv/(K)(Bottom Area
193 CF / ((2 in*hr)(1 ft / 12 in.)(96 SF))
12.25 hrs

Where:
Rv = Storage Volume per 2 unit Cultec
K = Saturated Hydraulic Conductivity
Bottom Area = Bottom Area of Recharge Structure

The entire system volume, which is far greater than the required recharge volume will drain down in less than the required 72 hour maximum.

The recharge on this site, as an infiltration BMP measure, will not alter or cause negative changes to the hydrologic regime.

The proposed redevelopment meets this standard.

4. **Water Quality**

The stormwater management system for this site collects runoff from the impervious surfaces, removes the required percentage of TSS, and discharges the treated runoff. The discharge is not directed toward or near a critical area, does not originate from a

Land Use with Higher Potential Pollution Loads (LUHPPL), and the site soils do not exhibit a rapid infiltration rate.

The required water quality volume (Vwq) was determined by the following formula per the Massachusetts Stormwater Standards.

Vwq = (0.5 in / 12 in/ft)(Impervious Area in sf)
Vwq building = (0.5 in / 12 in/ft)(9,569 sf)
Vwq = 399 cf Required Water Quality Volume
Vwq = (0.5 in / 12 in/ft)(Impervious Area in sf)
Vwq paved = (0.5 in / 12 in/ft)(4,451 sf)
Vwq = 185 cf Required Water Quality Volume

The proposed Vwq exceeds this volume as each of the the stormwater management system provides approximately 772 cubic feet (see HydroCad calculations). The system reduces the TSS by 80% (See Appendix D) as required. Therefore, the site complies with the regulations relative to water quality.

The proposed redevelopment meets this standard

5. Land Uses with Higher Potential Pollutant Load

This site is not a Land Use with Higher Potential Pollution Loads (LUHPPL).

This standard does not apply.

6. Discharges to critical areas

The project site is not located within a Zone II or Interim Wellhead Protection area of a public water supply or any other critical area. See appendices.

This standard does not apply.

7. Redevelopment Projects

In order to qualify as a redevelopment project, the project must meet the requirements listed in Volume 1, Chapter 1 of the Stormwater Management Handbook. The project will result in a reduction of impervious areas, which meets requirement 2 in the Handbook; see above sections for references. Regardless of warranted waivers, the project was designed to fully meet all the requirements of the Massachusetts Stormwater Standards.

This proposed redevelopment meets this standard.

8. Construction Phase Operation and Maintenance Plan

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan will be implemented generally as follows. The Owner may require the site contractor to prepare and submit specific plans if required under the NPDES program.

Narrative: As required, erosion and sedimentation control devices shall be implemented to prevent erosion during and after construction. The following erosion and sediment controls will be installed for this project:

- Initially, erosion controls will be installed at the limit of work along the down gradient site borders.

- Construction entrance apron pads will be constructed at the main site access to prevent the tracking of sediment on vehicle tires from transport onto adjacent streets if necessary.

- During construction, any slopes subject to erosion will be stabilized immediately upon completion with loam, hydro-seeding and/or erosion control blankets.

- During construction, water will be used as a dust suppressant in order to control particulate matter emissions during excavation.

Names of Persons or Entity Responsible for Plan Compliance: As part of the Submittal Process, the Landowner shall submit the names of responsible parties.

Construction Period O&M Plan: All erosion control devices shall be inspected on a weekly basis and after every rain event. The construction entrance pads will be inspected on a weekly basis and flushed with clean water in the event they become clogged with dirt.

Names of Persons or Entity Responsible for Plan Compliance: The landowner shall provide the names of the individual(s) responsible for plan compliance prior to commencement of construction.

Construction Period Pollution Prevention Measures: Erosion control measures as shown on the plan and/or as are standard practice shall be installed accordingly. Best Management Practices shall be implemented such as the locations for vehicle maintenance and refueling, storage of supplies, and refuse disposal.

Erosion and Sedimentation Control Plan Drawings: Contractor to install per approved site plan and standard practice if needed.

Detail Drawings and specifications for erosion control BMPs: Contractor may be requested to submit detail drawings and specifications for diversion swales, erosion control dikes and berms, and/or temporary sedimentation basins if required.

Vegetation Planning: Landscaping to be installed per plan.

Site Development Plan: All construction to be based upon approved plan. Plan shall have municipality stamp.

Construction Sequencing Plan: Contractor may be required to submit his plan for proposed sequencing of the work and the associated locations for any proposed diversion swales, erosion control dikes and berms, and temporary sedimentation basins.

Sequencing of Erosion and Sedimentation Controls: All Erosion and Sedimentation controls to be installed and inspected prior to any commencement of site work (other than tree removal necessary to install controls).

Inspection Schedule, Maintenance Schedule and Log Form: Attached to this report. See Appendices.

The proposed redevelopment meets this standard.

9. A long-term operation and maintenance plan

A long-term O&M has been prepared to ensure that the stormwater management system functions as designed. A copy of this O&M plan is included herein.

The proposed redevelopment meets this standard.

10. Illicit discharges

To the best of our knowledge and belief there will be no illicit discharges to the municipal stormwater management system from this site. See appendices for Illicit Discharge Statement. See O&M Plan for illicit discharge inspection information.

The proposed redevelopment meets this standard.

Appendix 'A'

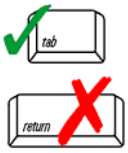
MassDEP Checklist for Stormwater Report

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [X] Reduced Impervious Area (Redevelopment Only)
- [X] 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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

Appendix 'B'

OPERATION AND MAINTENANCE PLAN/
Long Term Pollution Prevention Plan

for

120 Nantasket Ave., Hull, MA

The proponent/owner is responsible for the operation and maintenance of the proposed stormwater management system as follows:

Stormwater Management System Owners: _____

Party Responsible for the O & M: Home owner

Schedule for Implementation: see O & M Schedule

Plan showing the location of all Stormwater BMPs: See Site Plan Titled – Plan of Land Prepared for Latitude 42 Real Estate LLc., 120 Nantasket Aveue, Hull, MA by Atlantic Coast Engineering, 88 Front Street, Scituate, Mass., dated 10/15/22.

Log Form: See below.

Description of proposed O & M:

After construction, the site shall be inspected to assure that the landscaping is stabilized. If the site is stabilized, then any previously required perimeter erosion control devices shall be removed.

The proposed underground infiltration system shall have at least one PVC inspection port to inspect the system. If excessive buildup of sediment or prolonged periods of standing water are found, the systems will require maintenance by a company familiar with the long-term maintenance and repair of these types of systems.

Other site areas, including the grassed waterway shall be inspected for erosion and repairs implemented as needed and with the frequency shown in the attached schedule.

All illicit non-stormwater discharges into the stormwater system are prohibited.

_____

Accepted By: Date:

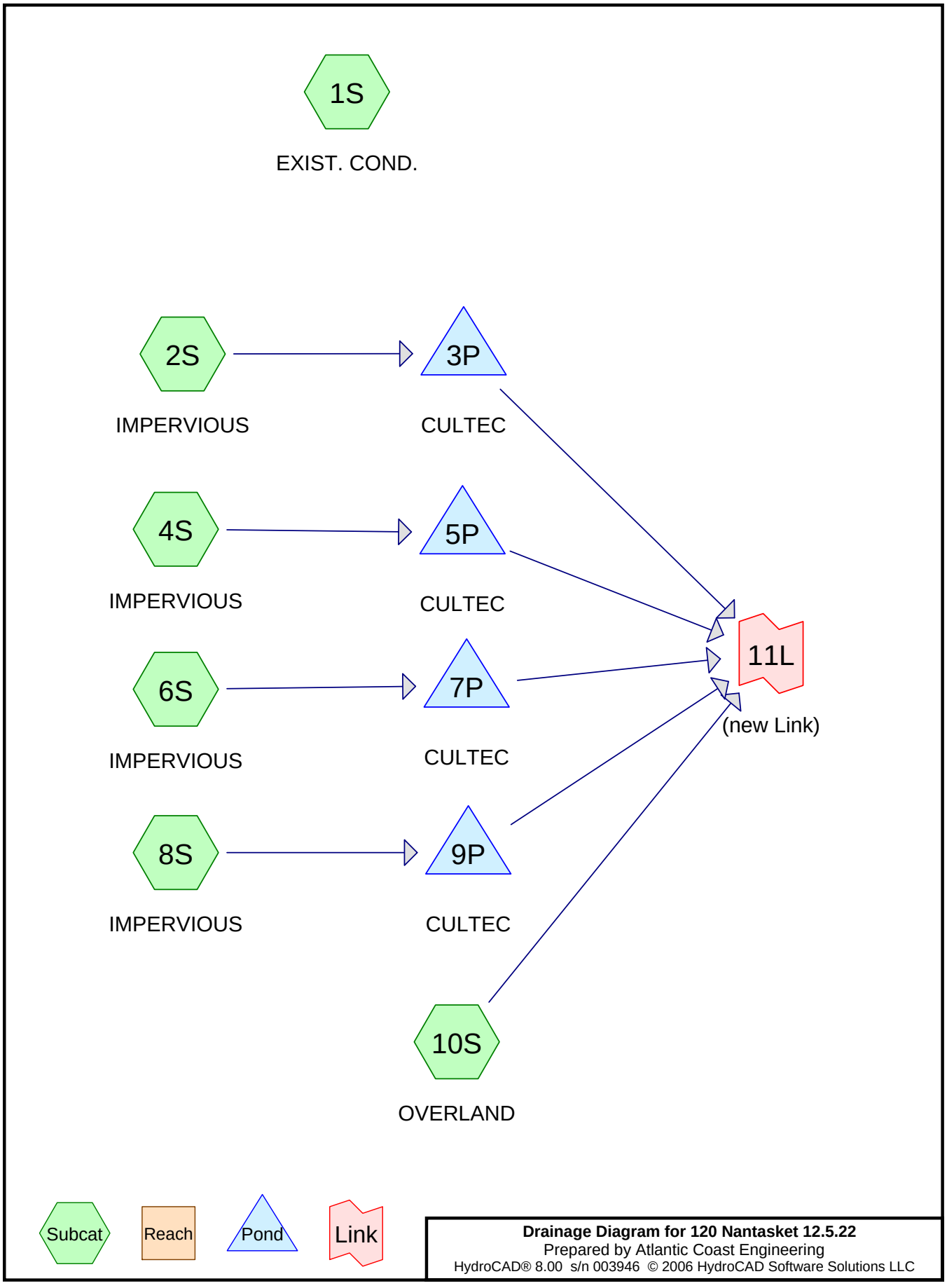
Stormwater Management Operation and Maintenance Schedule
Property: 120 Nantasket Ave, Hull, MA
Date: _____

BMP	Frequency	Date Performed	Comments	Cleaning/ Repair Needed? Yes/No	Date of Cleaning/ Repair	Performed By
Subsurface Infiltration Systems Inspect for proper functioning	After every major storm during first three months and twice per year thereafter.					
Overflow Discharge outlets Inspect for erosion.	After every major storm during first three months and twice per year thereafter.					
Roof Drains & Gutters Inspect for proper functioning	Cleaned and maintained as needed.					
Illicit Discharges Inspect system to verify no illicit discharges exist.	Once per year during dry season.					

Appendix 'C'

HydroCad Calculations

(Attached)



Drainage Diagram for 120 Nantasket 12.5.22
Prepared by Atlantic Coast Engineering

Subcatchment 1S: EXIST. COND.

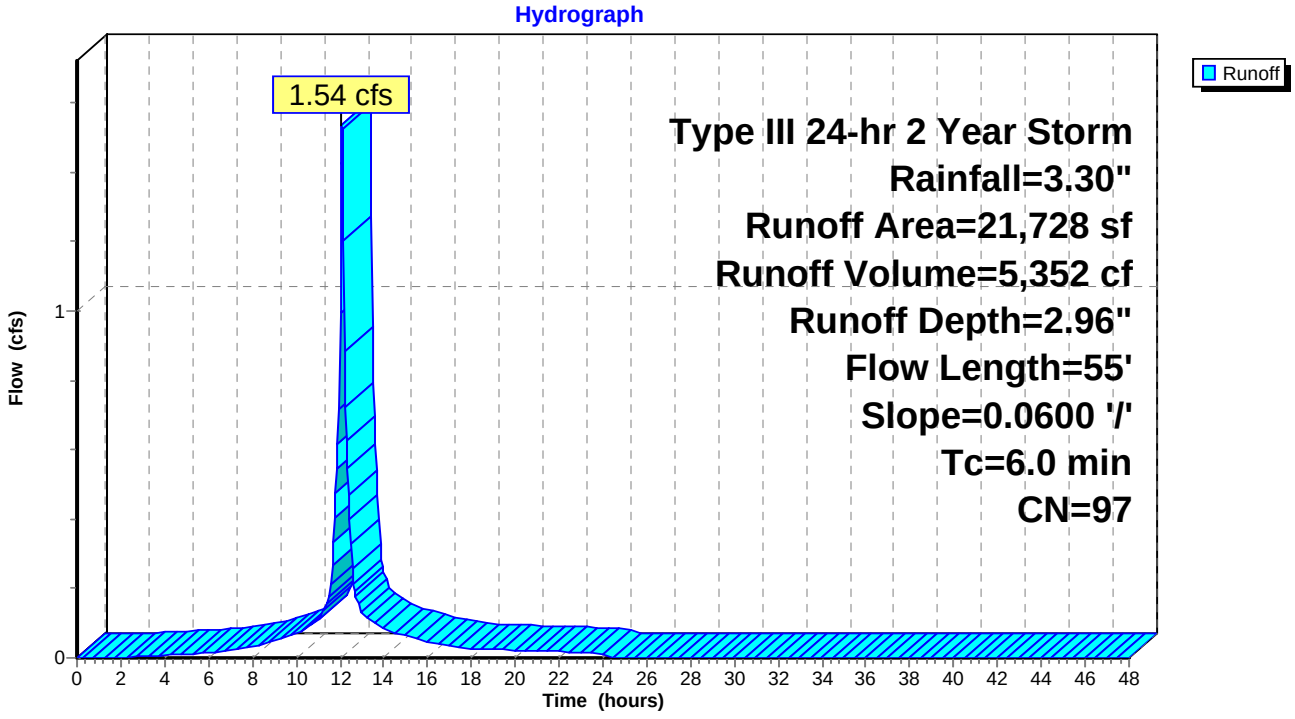
Runoff = 1.54 cfs @ 12.09 hrs, Volume= 5,352 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.30"

Area (sf)	CN	Description
9,495	98	Building
8,345	98	Hardscapes
2,835	98	Ledge
1,053	84	50-75% Grass cover, Fair, HSG D
21,728	97	Weighted Average
1,053		Pervious Area
20,675		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: EXIST. COND.



Subcatchment 2S: IMPERVIOUS

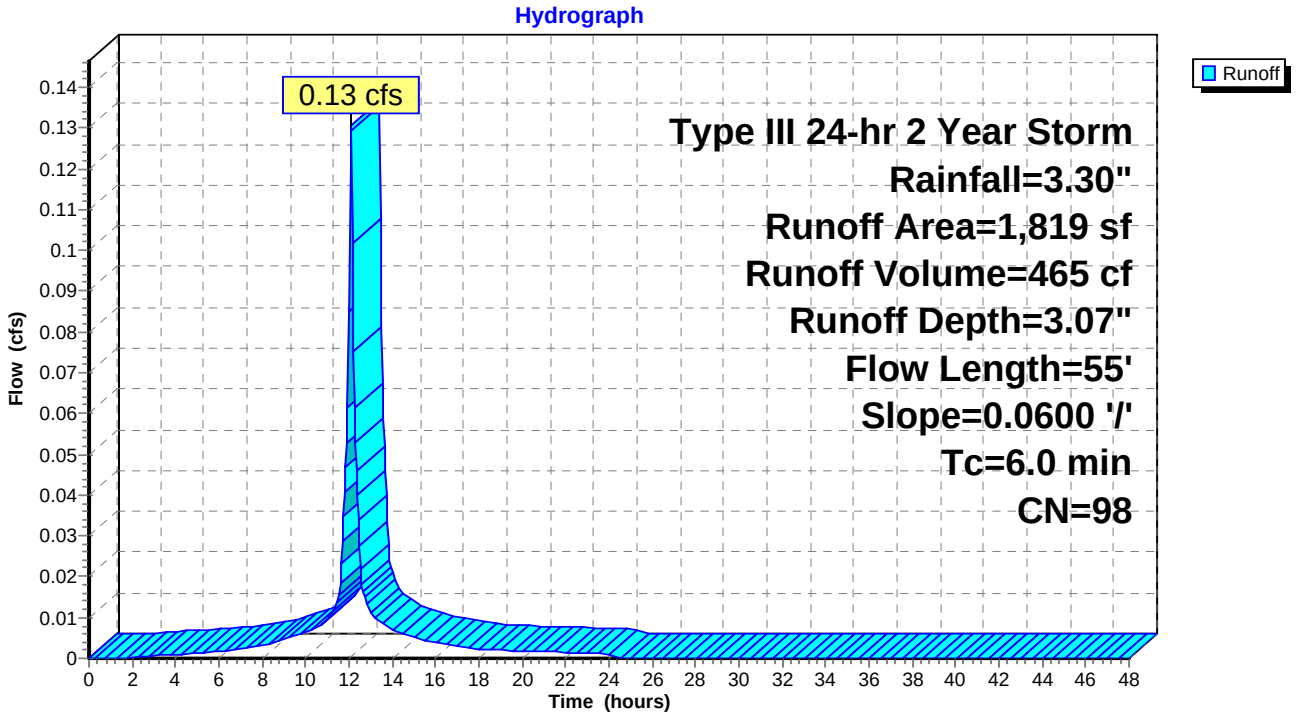
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 465 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.30"

Area (sf)	CN	Description
1,020	98	Building
799	98	Drive & Ramp
1,819	98	Weighted Average
1,819		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS



Subcatchment 4S: IMPERVIOUS

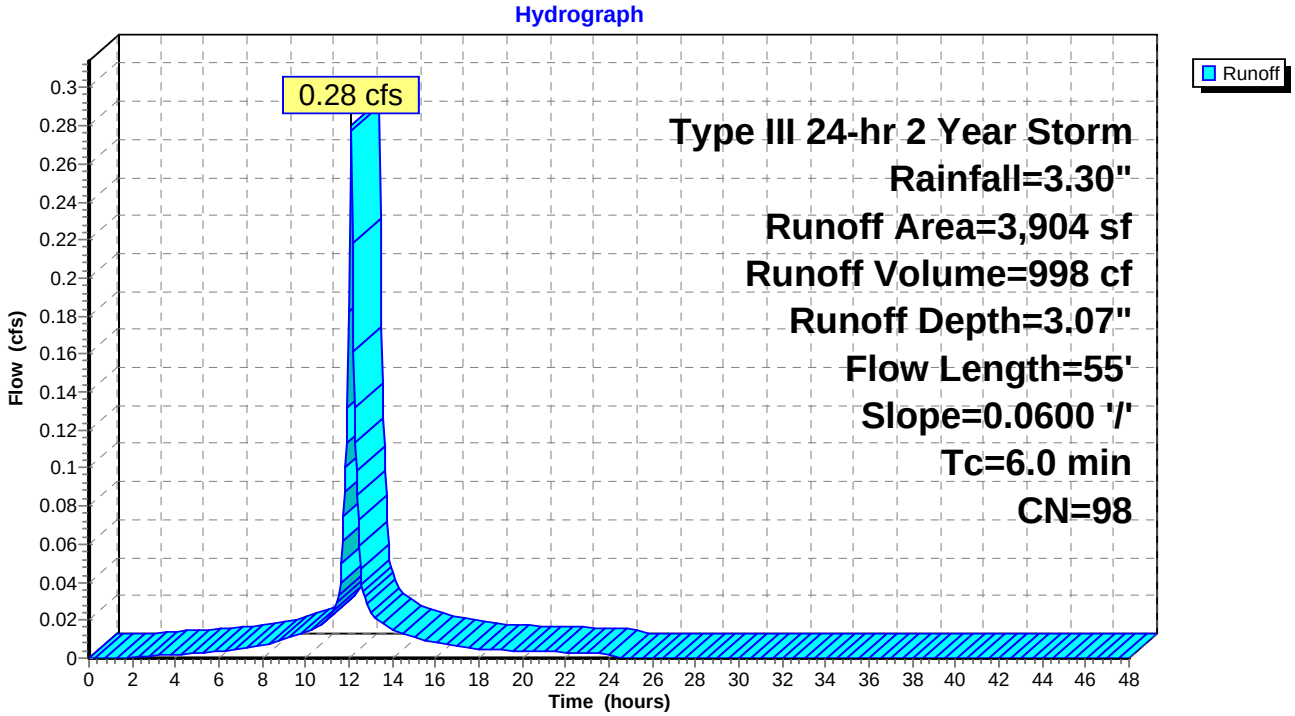
Runoff = 0.28 cfs @ 12.09 hrs, Volume= 998 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.30"

Area (sf)	CN	Description
3,904	98	Building
3,904		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4S: IMPERVIOUS



Subcatchment 6S: IMPERVIOUS

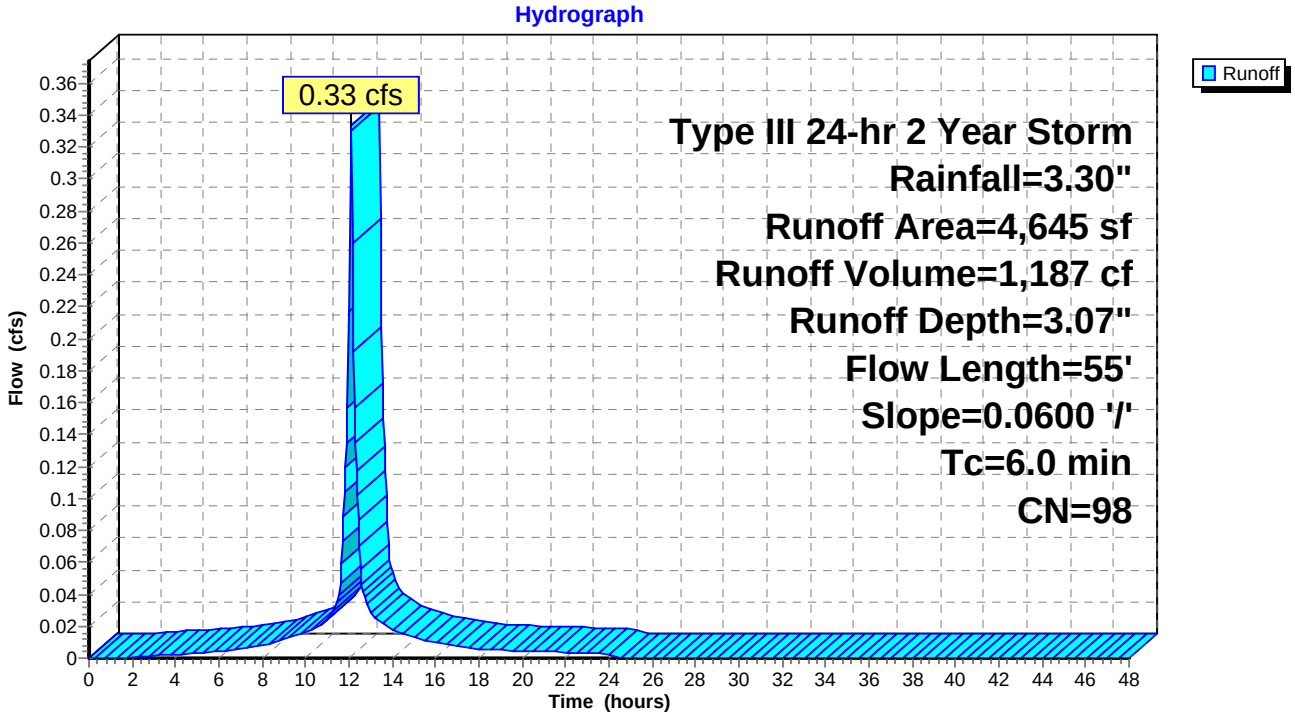
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 1,187 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.30"

Area (sf)	CN	Description
4,645	98	Building
4,645		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6S: IMPERVIOUS



Subcatchment 8S: IMPERVIOUS

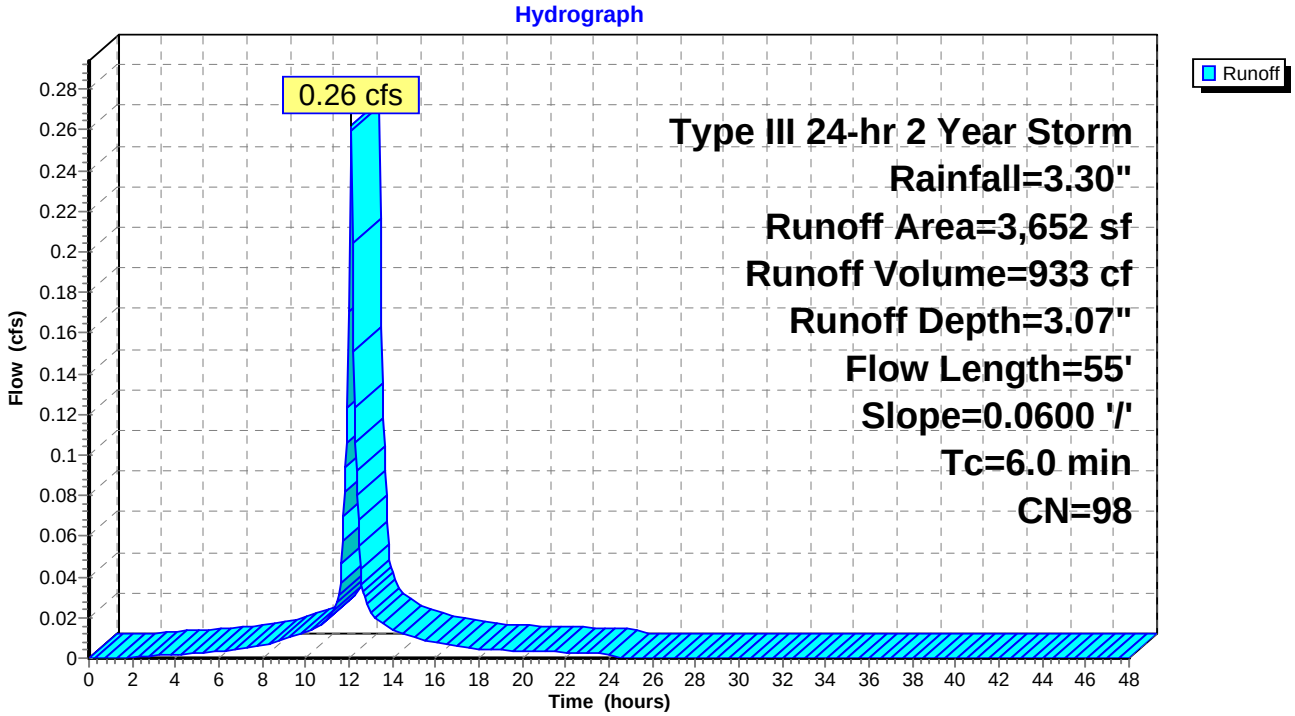
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 933 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.30"

Area (sf)	CN	Description
3,652	98	Drive & Ramp
3,652		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8S: IMPERVIOUS



Subcatchment 10S: OVERLAND

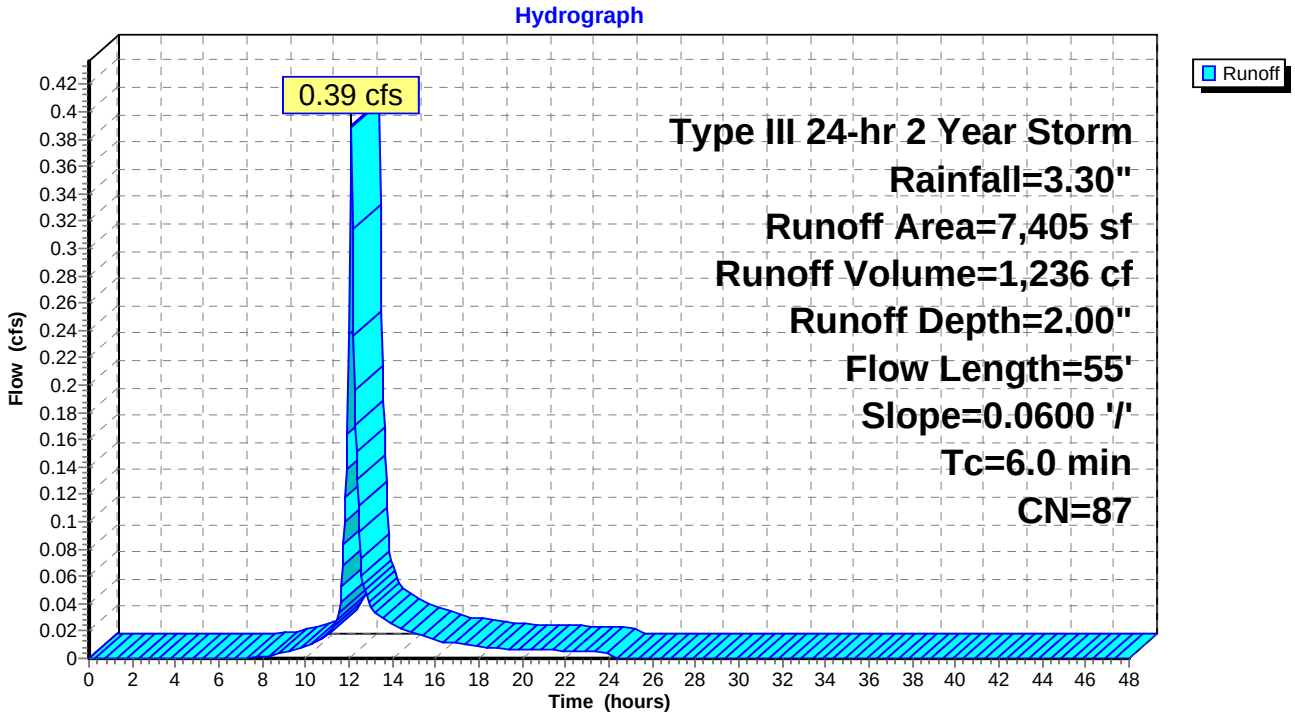
Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,236 cf, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.30"

Area (sf)	CN	Description
1,235	98	Parking
2,835	98	Ledge
3,335	74	Compost Amended Grass
7,405	87	Weighted Average
3,335		Pervious Area
4,070		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10S: OVERLAND



Pond 3P: CULTEC

Inflow Area = 1,819 sf, Inflow Depth = 3.07" for 2 Year Storm event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 465 cf
Outflow = 0.01 cfs @ 12.40 hrs, Volume= 407 cf, Atten= 90%, Lag= 19.1 min
Discarded = 0.00 cfs @ 9.10 hrs, Volume= 405 cf
Primary = 0.01 cfs @ 12.40 hrs, Volume= 2 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.18' @ 12.42 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 434.7 min calculated for 406 cf (87% of inflow)
Center-of-Mass det. time= 377.7 min (1,133.5 - 755.8)

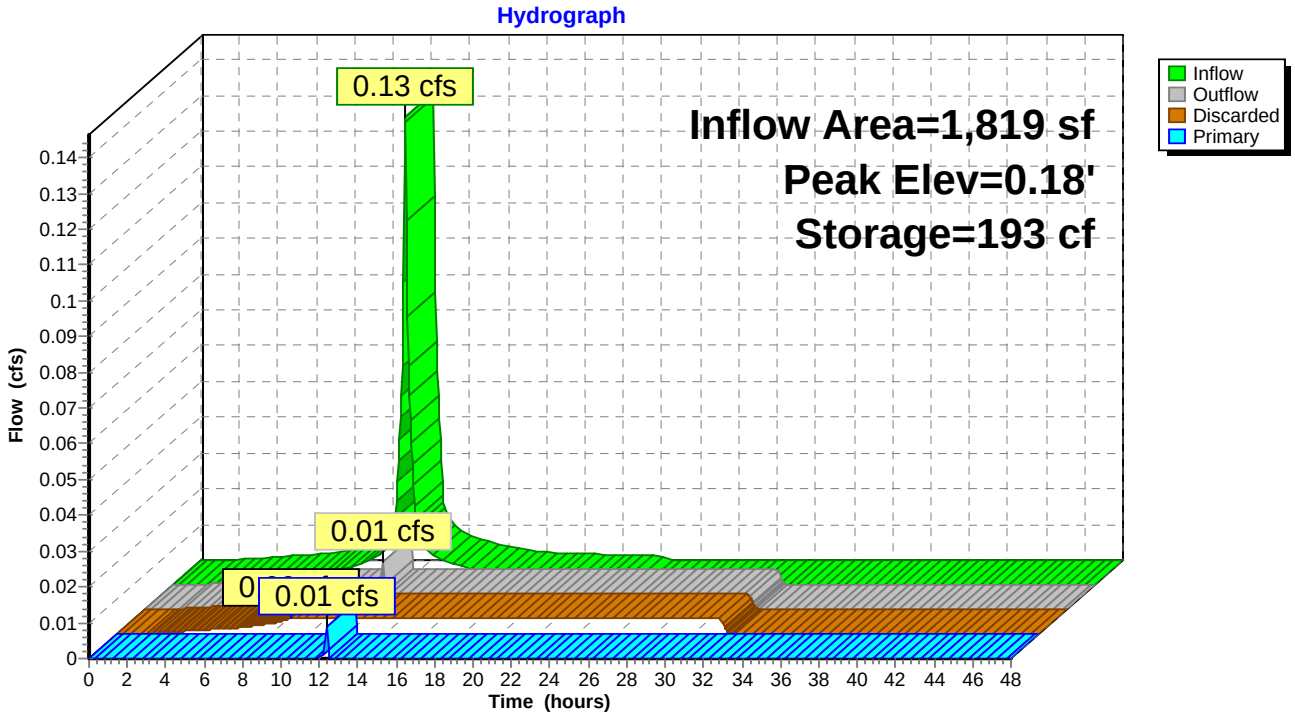
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 9.10 hrs HW=-4.95' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 12.40 hrs HW=0.00' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.09 fps)
└**3=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.09 fps)

Pond 3P: CULTEC



Pond 5P: CULTEC

Inflow Area = 3,904 sf, Inflow Depth = 3.07" for 2 Year Storm event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 998 cf
Outflow = 0.31 cfs @ 12.06 hrs, Volume= 1,009 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 6.85 hrs, Volume= 490 cf
Primary = 0.30 cfs @ 12.06 hrs, Volume= 519 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 7
Peak Elev= 0.30' @ 12.06 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 194.8 min calculated for 998 cf (100% of inflow)
Center-of-Mass det. time= 207.7 min (963.4 - 755.8)

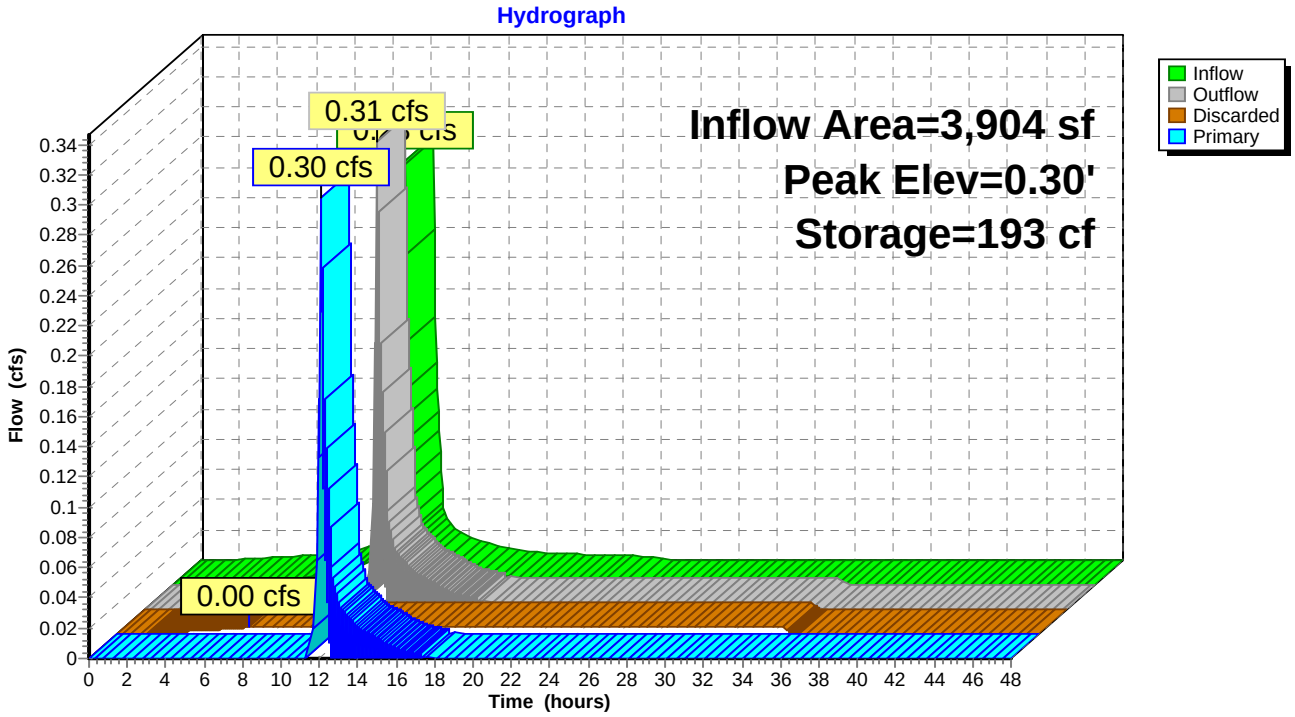
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 6.85 hrs HW=-4.95' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.29 cfs @ 12.06 hrs HW=0.29' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.29 cfs @ 1.82 fps)

Pond 5P: CULTEC



Pond 7P: CULTEC

Inflow Area = 4,645 sf, Inflow Depth = 3.07" for 2 Year Storm event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 1,187 cf
Outflow = 0.33 cfs @ 12.09 hrs, Volume= 1,189 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 6.35 hrs, Volume= 507 cf
Primary = 0.33 cfs @ 12.09 hrs, Volume= 681 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.24' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 185.7 min calculated for 1,186 cf (100% of inflow)
Center-of-Mass det. time= 187.6 min (943.4 - 755.8)

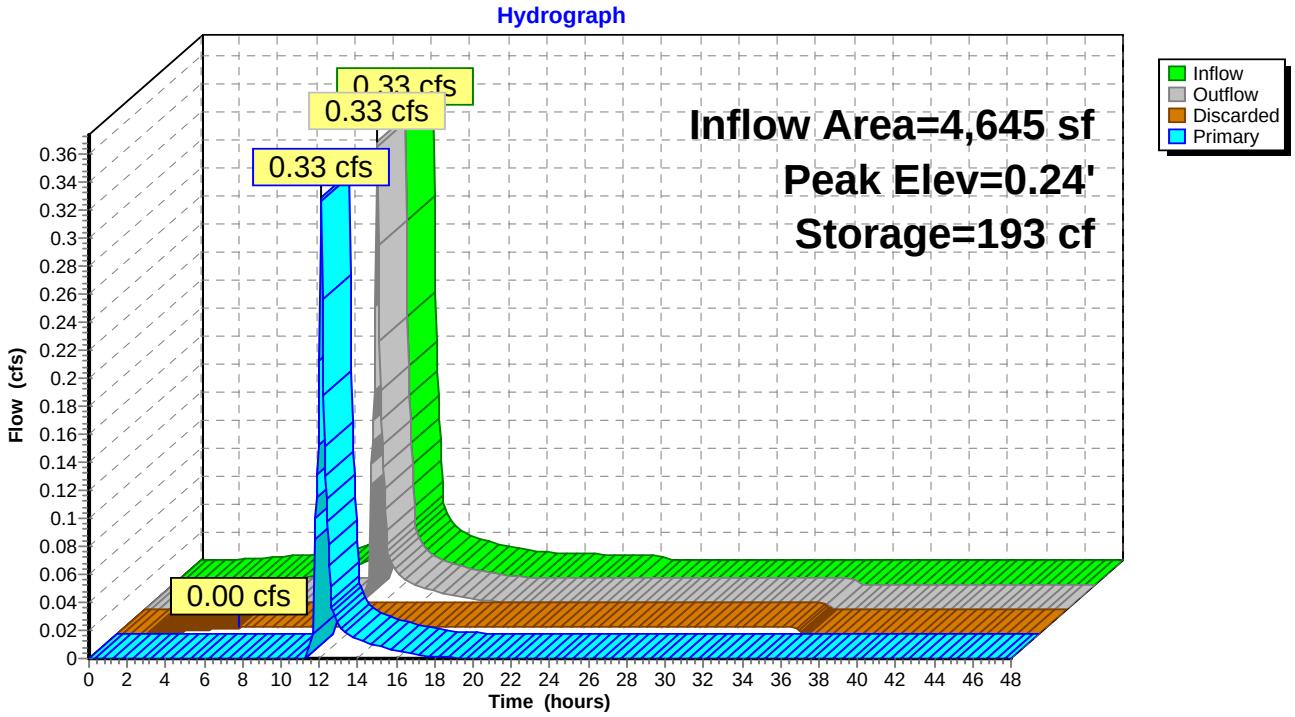
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 6.35 hrs HW=-4.95' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.32 cfs @ 12.09 hrs HW=0.23' (Free Discharge)
↑└**2=Orifice/Grate** (Orifice Controls 0.32 cfs @ 1.64 fps)

Pond 7P: CULTEC



Pond 9P: CULTEC

Inflow Area = 3,652 sf, Inflow Depth = 3.07" for 2 Year Storm event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 933 cf
Outflow = 0.22 cfs @ 12.09 hrs, Volume= 686 cf, Atten= 18%, Lag= 0.0 min
Discarded = 0.00 cfs @ 7.05 hrs, Volume= 483 cf
Primary = 0.21 cfs @ 12.09 hrs, Volume= 203 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 0.01' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 373.2 min calculated for 686 cf (74% of inflow)
Center-of-Mass det. time= 284.6 min (1,040.3 - 755.8)

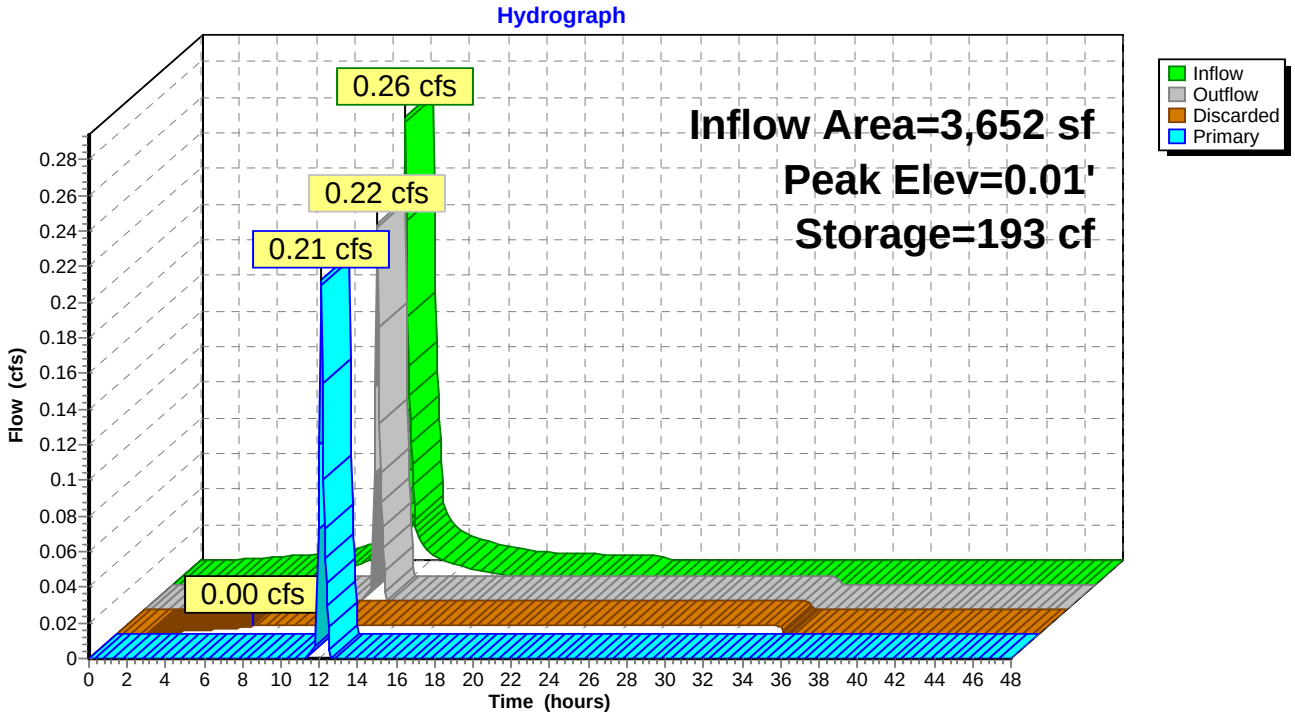
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 7.05 hrs HW=-4.95' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.09 cfs @ 12.09 hrs HW=0.01' (Free Discharge)
↑└**2=Orifice/Grate** (Weir Controls 0.09 cfs @ 0.33 fps)

Pond 9P: CULTEC

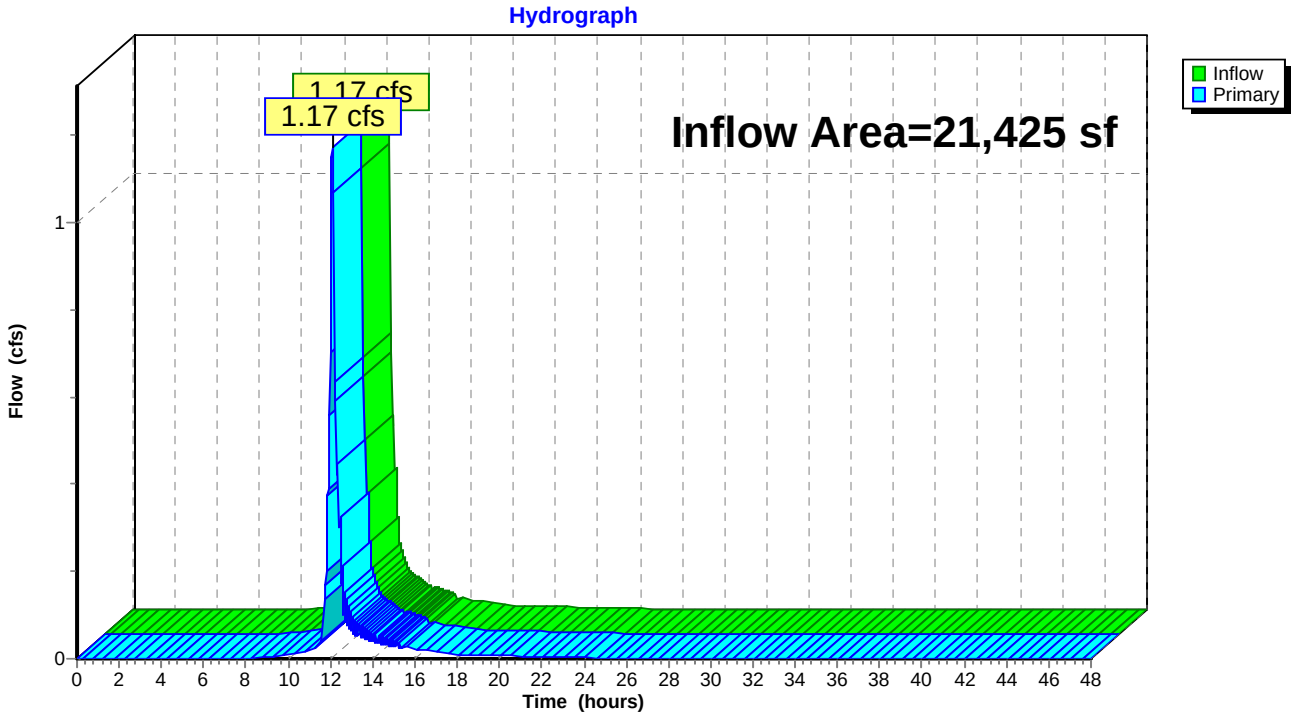


Link 11L: (new Link)

Inflow Area = 21,425 sf, Inflow Depth = 1.48" for 2 Year Storm event
Inflow = 1.17 cfs @ 12.08 hrs, Volume= 2,642 cf
Primary = 1.17 cfs @ 12.08 hrs, Volume= 2,642 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 11L: (new Link)



Subcatchment 1S: EXIST. COND.

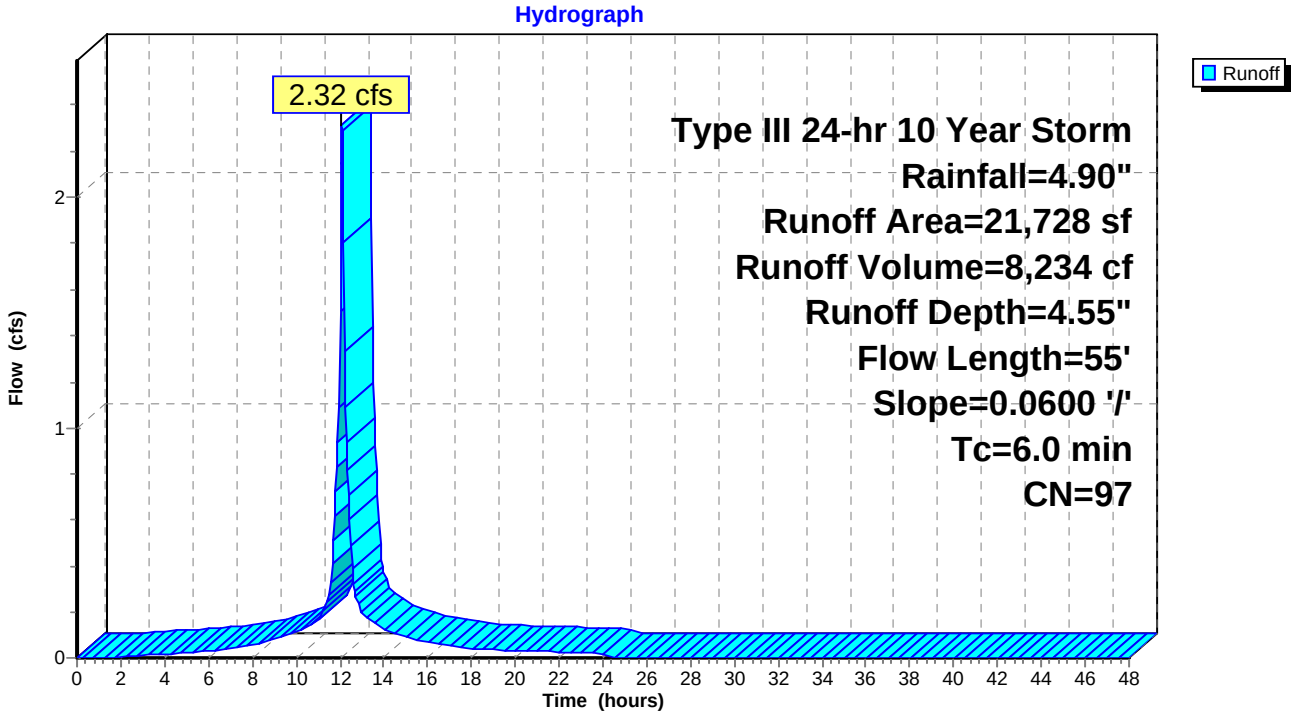
Runoff = 2.32 cfs @ 12.09 hrs, Volume= 8,234 cf, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
9,495	98	Building
8,345	98	Hardscapes
2,835	98	Ledge
1,053	84	50-75% Grass cover, Fair, HSG D
21,728	97	Weighted Average
1,053		Pervious Area
20,675		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: EXIST. COND.



Subcatchment 2S: IMPERVIOUS

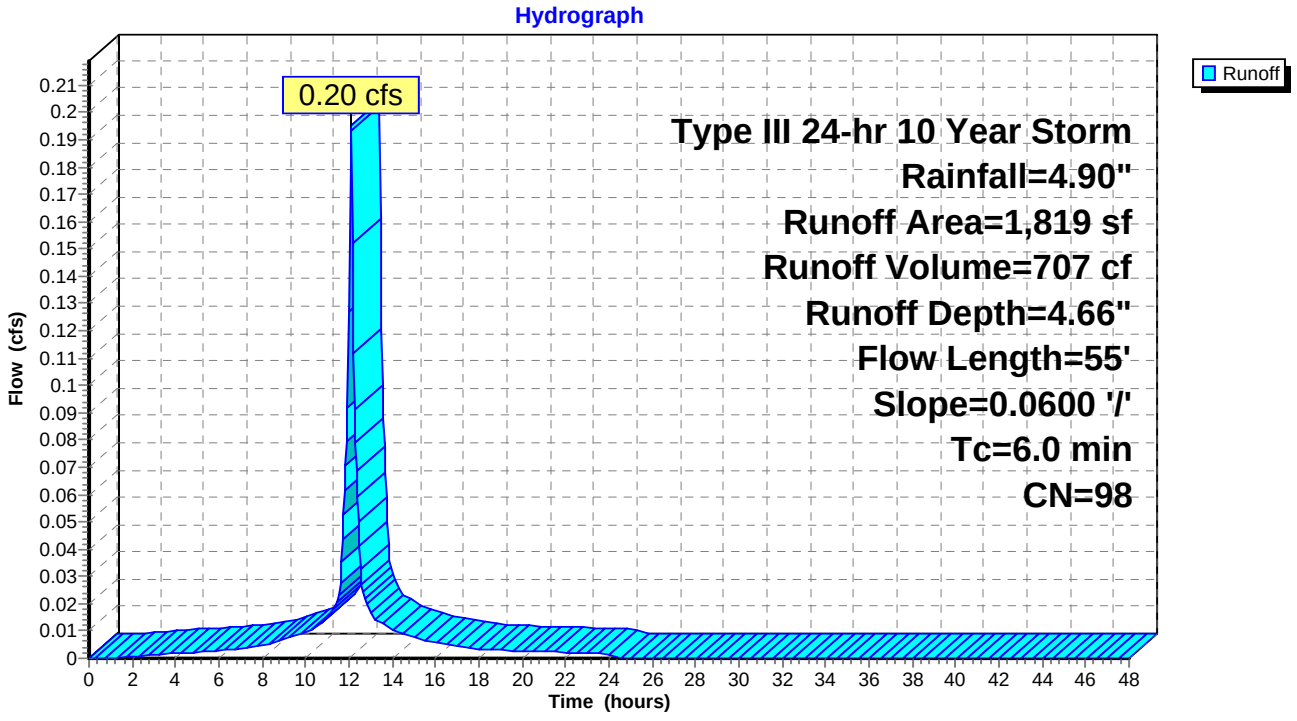
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 707 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
1,020	98	Building
799	98	Drive & Ramp
1,819	98	Weighted Average
1,819		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS



Subcatchment 4S: IMPERVIOUS

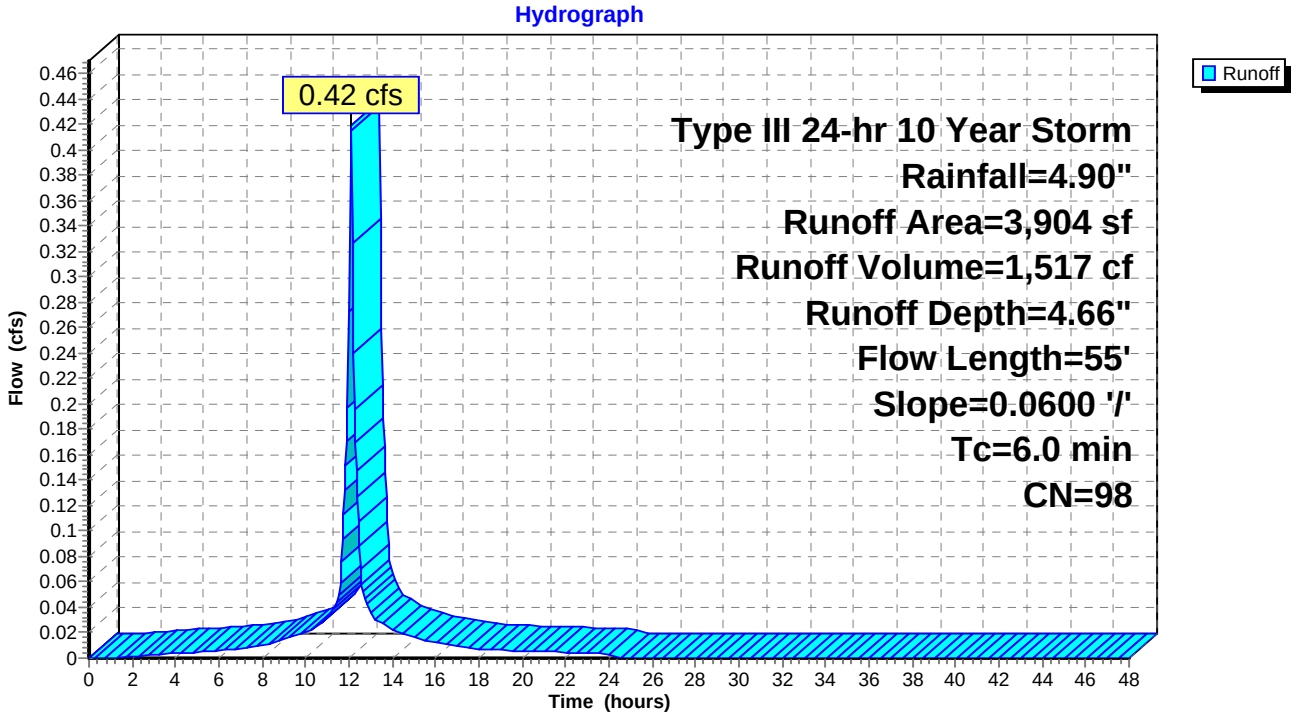
Runoff = 0.42 cfs @ 12.09 hrs, Volume= 1,517 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
3,904	98	Building
3,904		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4S: IMPERVIOUS



Subcatchment 6S: IMPERVIOUS

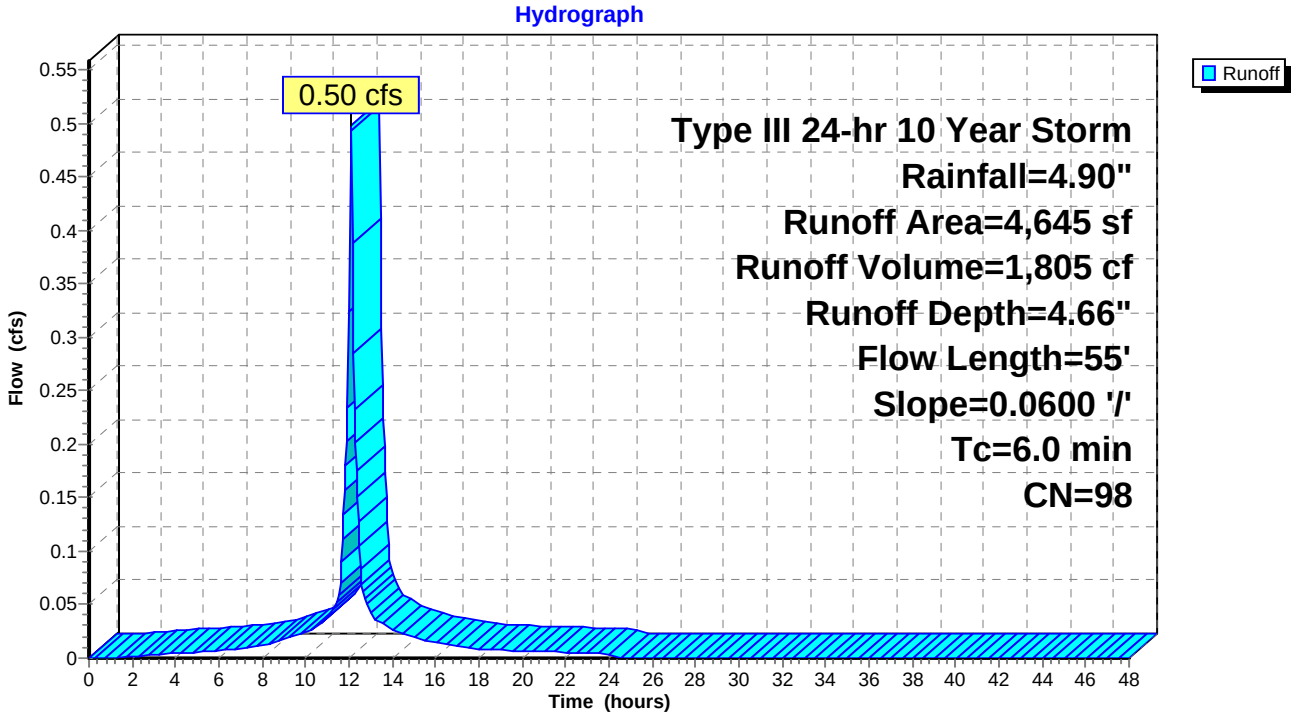
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 1,805 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
4,645	98	Building
4,645		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6S: IMPERVIOUS



Subcatchment 8S: IMPERVIOUS

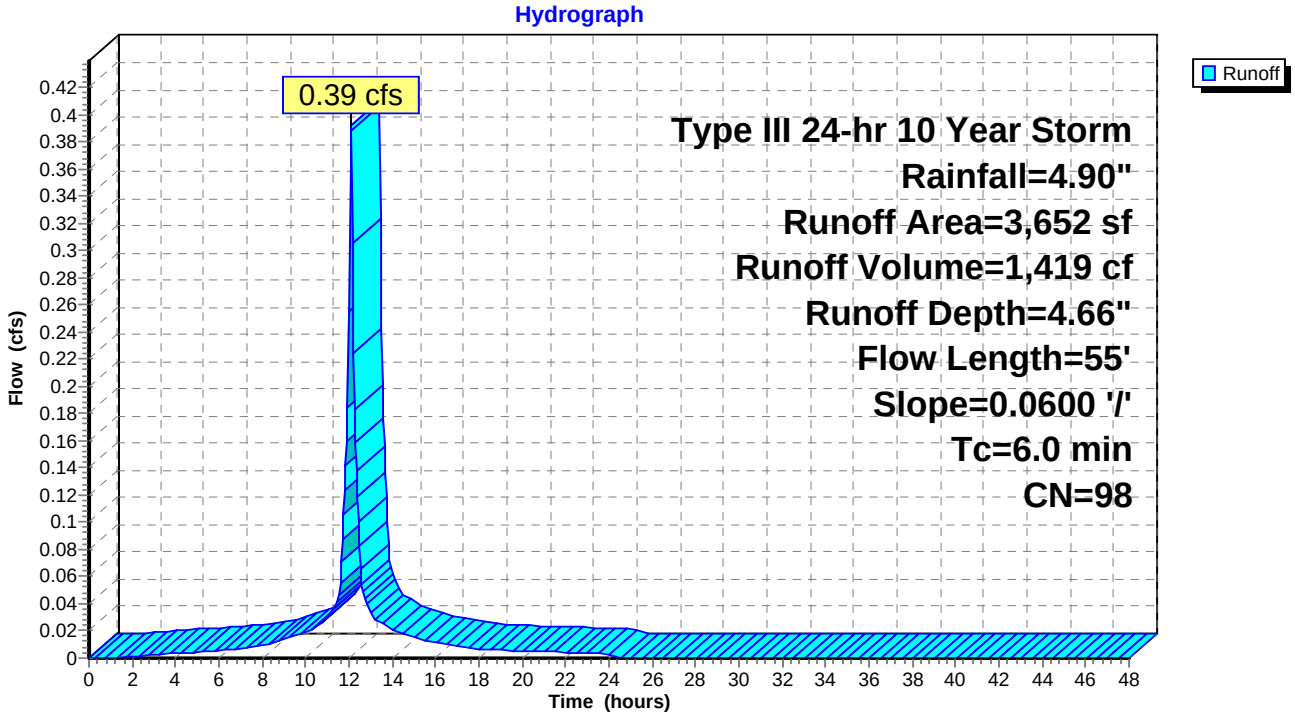
Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,419 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
3,652	98	Drive & Ramp
3,652		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8S: IMPERVIOUS



Subcatchment 10S: OVERLAND

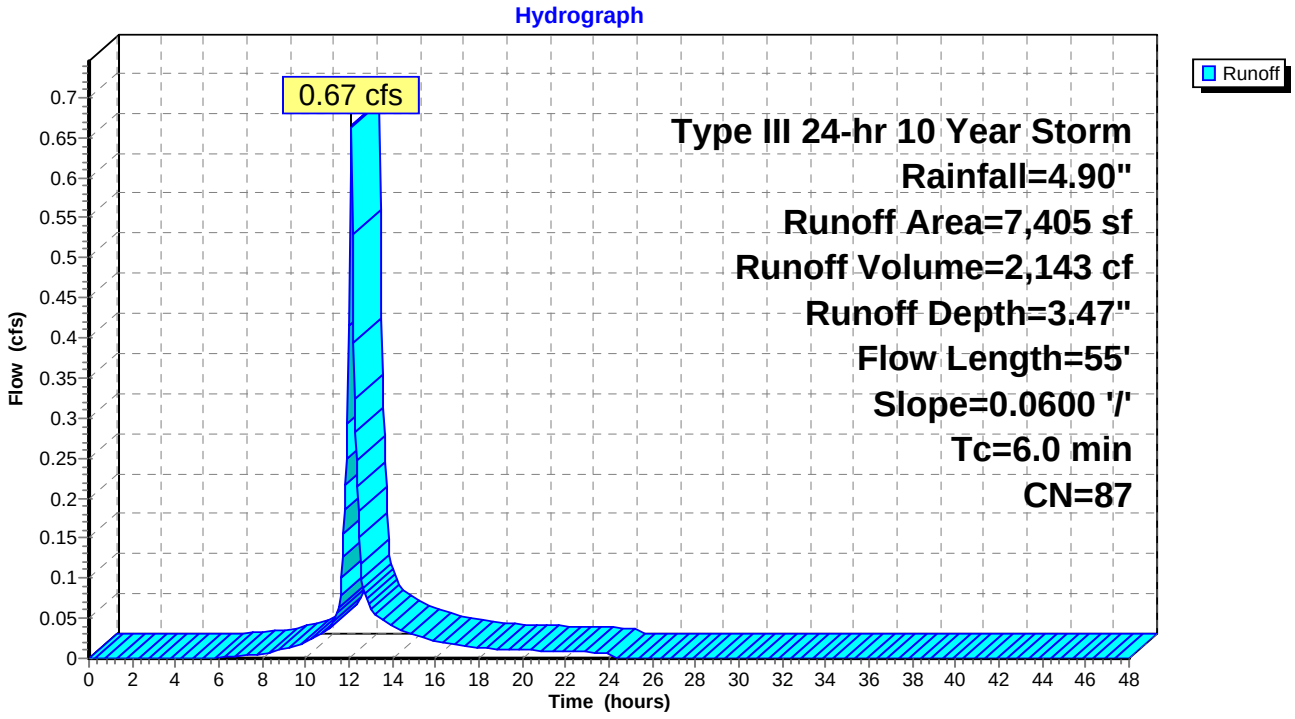
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,143 cf, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
1,235	98	Parking
2,835	98	Ledge
3,335	74	Compost Amended Grass
7,405	87	Weighted Average
3,335		Pervious Area
4,070		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10S: OVERLAND



Pond 3P: CULTEC

Inflow Area = 1,819 sf, Inflow Depth = 4.66" for 10 Year Storm event
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 707 cf
Outflow = 0.12 cfs @ 12.11 hrs, Volume= 496 cf, Atten= 40%, Lag= 1.5 min
Discarded = 0.00 cfs @ 7.80 hrs, Volume= 458 cf
Primary = 0.11 cfs @ 12.11 hrs, Volume= 38 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.01' @ 12.10 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 453.4 min calculated for 496 cf (70% of inflow)
Center-of-Mass det. time= 358.4 min (1,106.8 - 748.4)

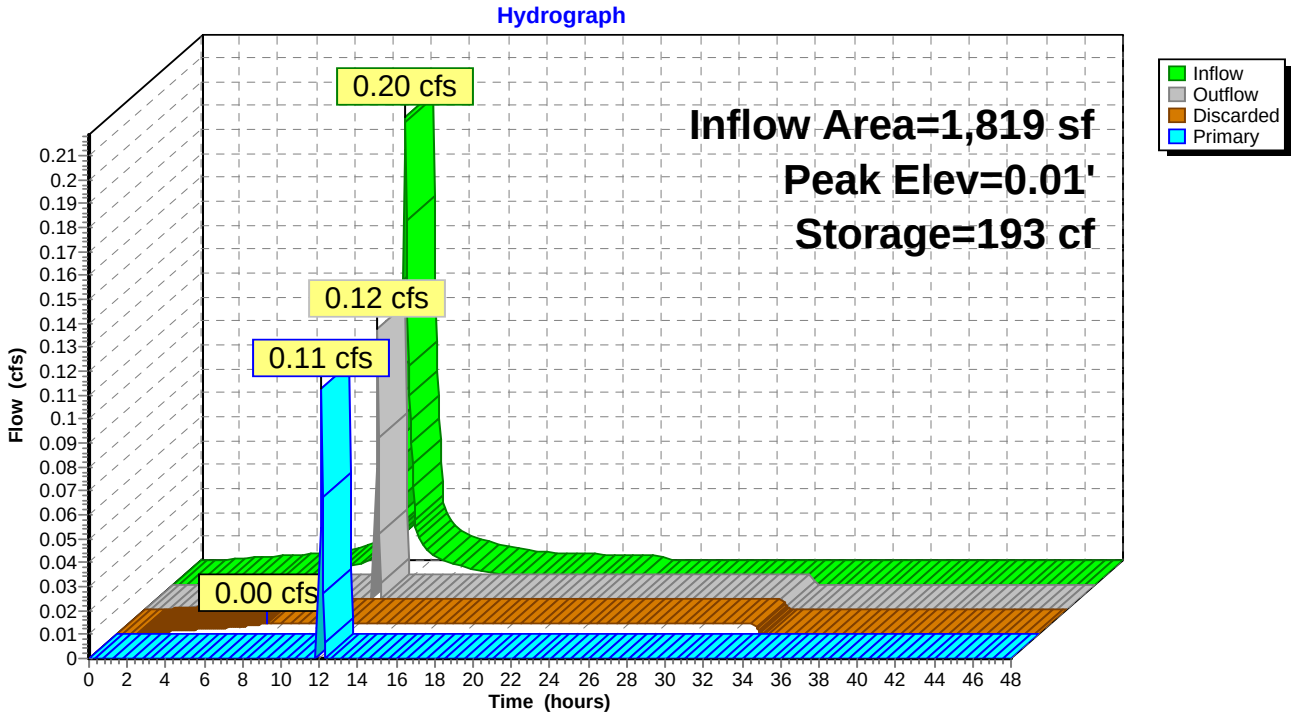
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 7.80 hrs HW=-4.95' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.08 cfs @ 12.11 hrs HW=0.01' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.33 fps)
└**3=Orifice/Grate** (Weir Controls 0.08 cfs @ 0.32 fps)

Pond 3P: CULTEC



Pond 5P: CULTEC

Inflow Area = 3,904 sf, Inflow Depth = 4.66" for 10 Year Storm event
Inflow = 0.42 cfs @ 12.09 hrs, Volume= 1,517 cf
Outflow = 0.42 cfs @ 12.07 hrs, Volume= 1,517 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 4.65 hrs, Volume= 534 cf
Primary = 0.42 cfs @ 12.07 hrs, Volume= 982 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 7
Peak Elev= 0.41' @ 12.07 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 158.2 min calculated for 1,517 cf (100% of inflow)
Center-of-Mass det. time= 158.0 min (906.3 - 748.4)

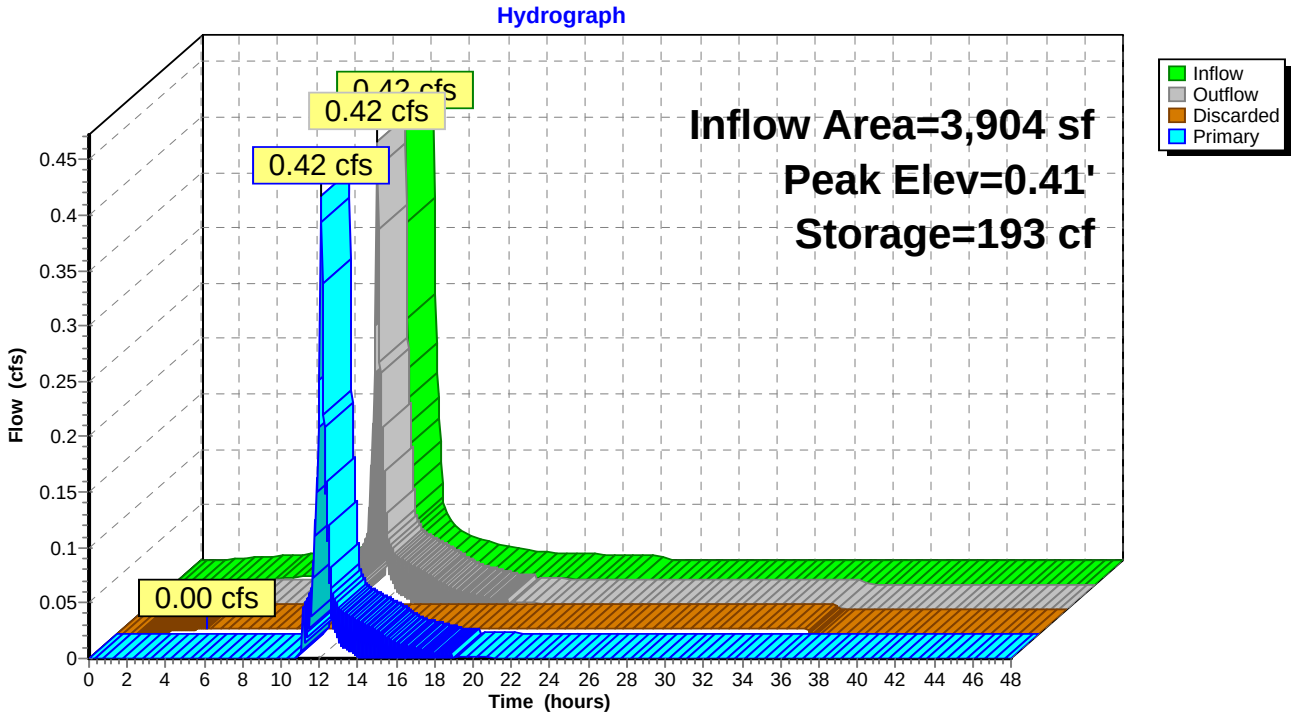
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 4.65 hrs HW=-4.95' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.40 cfs @ 12.07 hrs HW=0.39' (Free Discharge)
↑└**2=Orifice/Grate** (Orifice Controls 0.40 cfs @ 2.28 fps)

Pond 5P: CULTEC



Pond 7P: CULTEC

Inflow Area = 4,645 sf, Inflow Depth = 4.66" for 10 Year Storm event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 1,805 cf
Outflow = 0.48 cfs @ 12.09 hrs, Volume= 1,310 cf, Atten= 5%, Lag= 0.0 min
Discarded = 0.00 cfs @ 3.95 hrs, Volume= 541 cf
Primary = 0.47 cfs @ 12.09 hrs, Volume= 769 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.31' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 246.4 min calculated for 1,310 cf (73% of inflow)
Center-of-Mass det. time= 155.2 min (903.5 - 748.4)

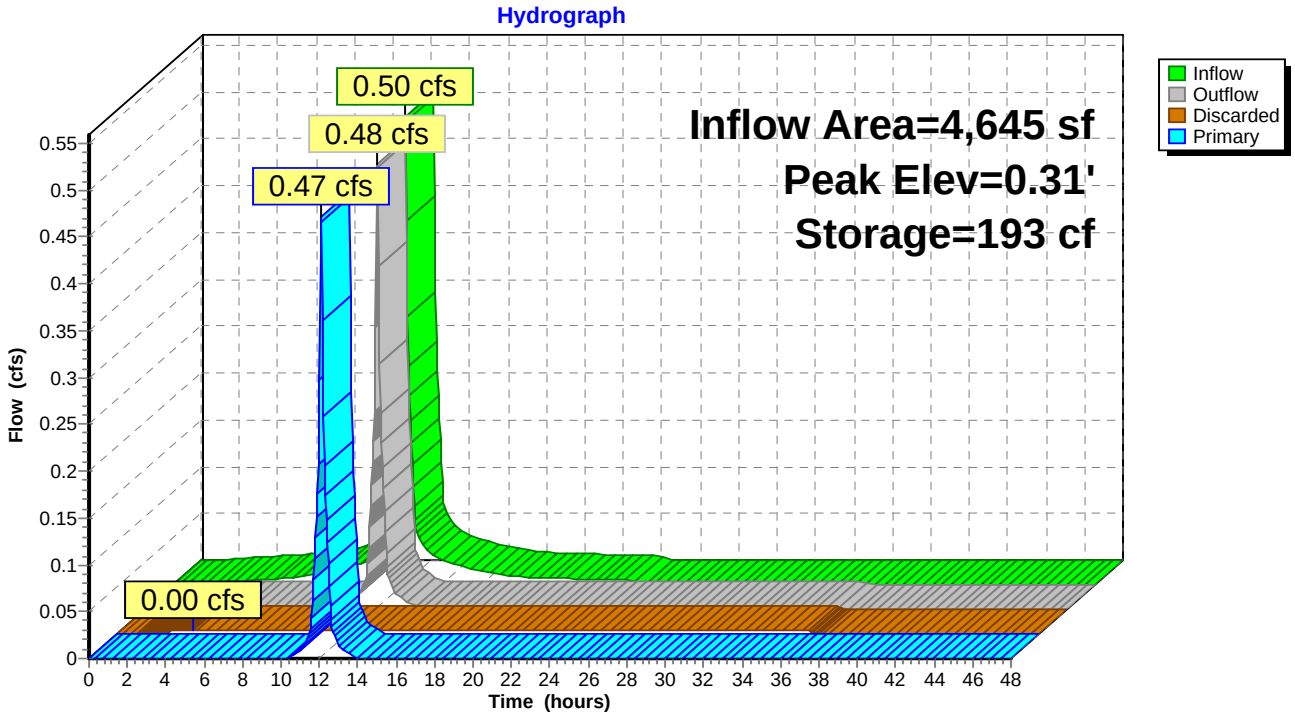
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 3.95 hrs HW=-4.95' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.46 cfs @ 12.09 hrs HW=0.30' (Free Discharge)
↑└**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 1.87 fps)

Pond 7P: CULTEC



Pond 9P: CULTEC

Inflow Area = 3,652 sf, Inflow Depth = 4.66" for 10 Year Storm event
Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,419 cf
Outflow = 0.37 cfs @ 12.09 hrs, Volume= 1,072 cf, Atten= 6%, Lag= 0.0 min
Discarded = 0.00 cfs @ 4.95 hrs, Volume= 531 cf
Primary = 0.37 cfs @ 12.09 hrs, Volume= 541 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 0.02' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 278.4 min calculated for 1,071 cf (75% of inflow)
Center-of-Mass det. time= 193.6 min (941.9 - 748.4)

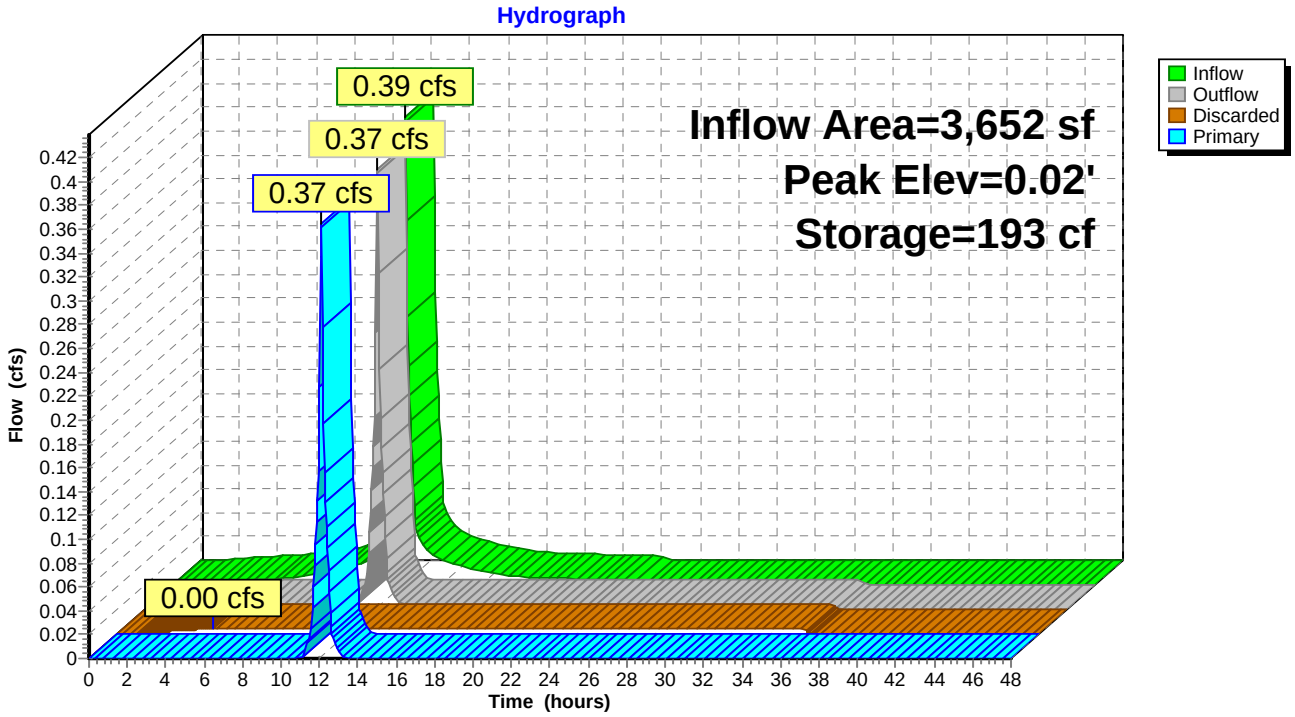
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 4.95 hrs HW=-4.95' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.21 cfs @ 12.09 hrs HW=0.02' (Free Discharge)
↑└**2=Orifice/Grate** (Weir Controls 0.21 cfs @ 0.43 fps)

Pond 9P: CULTEC

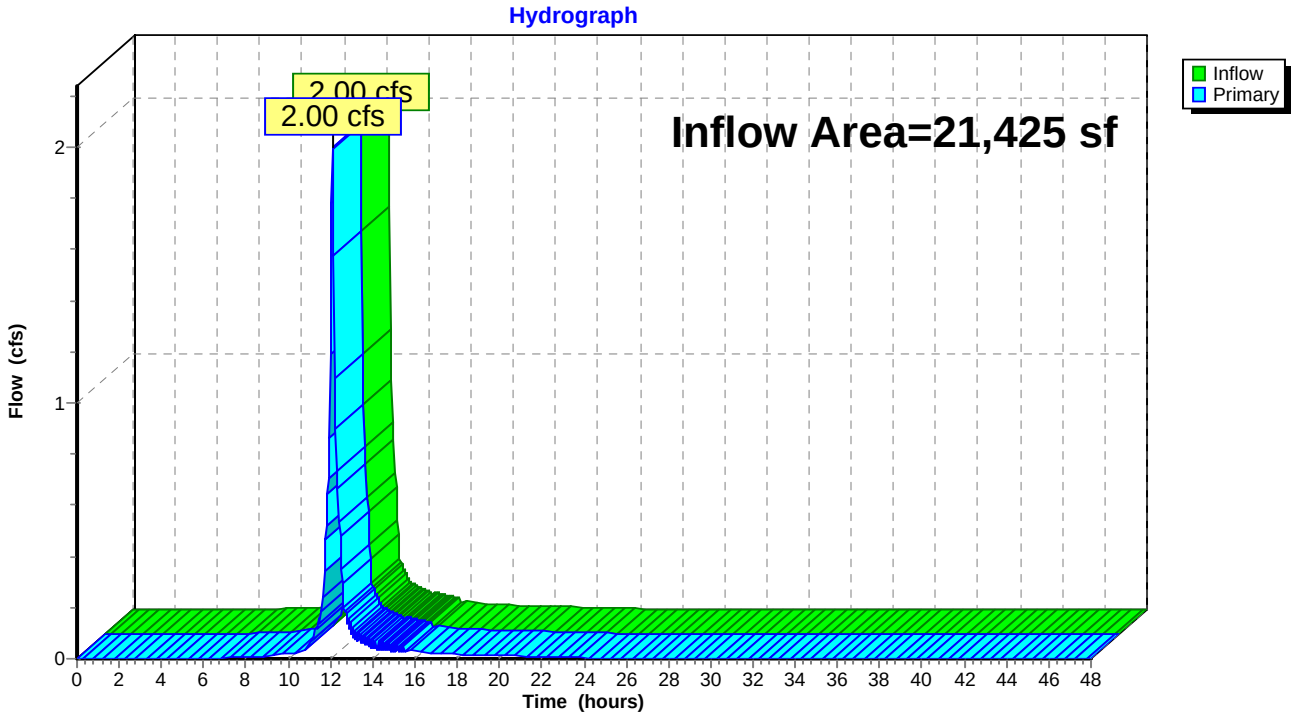


Link 11L: (new Link)

Inflow Area = 21,425 sf, Inflow Depth = 2.51" for 10 Year Storm event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 4,474 cf
Primary = 2.00 cfs @ 12.09 hrs, Volume= 4,474 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 11L: (new Link)



Subcatchment 1S: EXIST. COND.

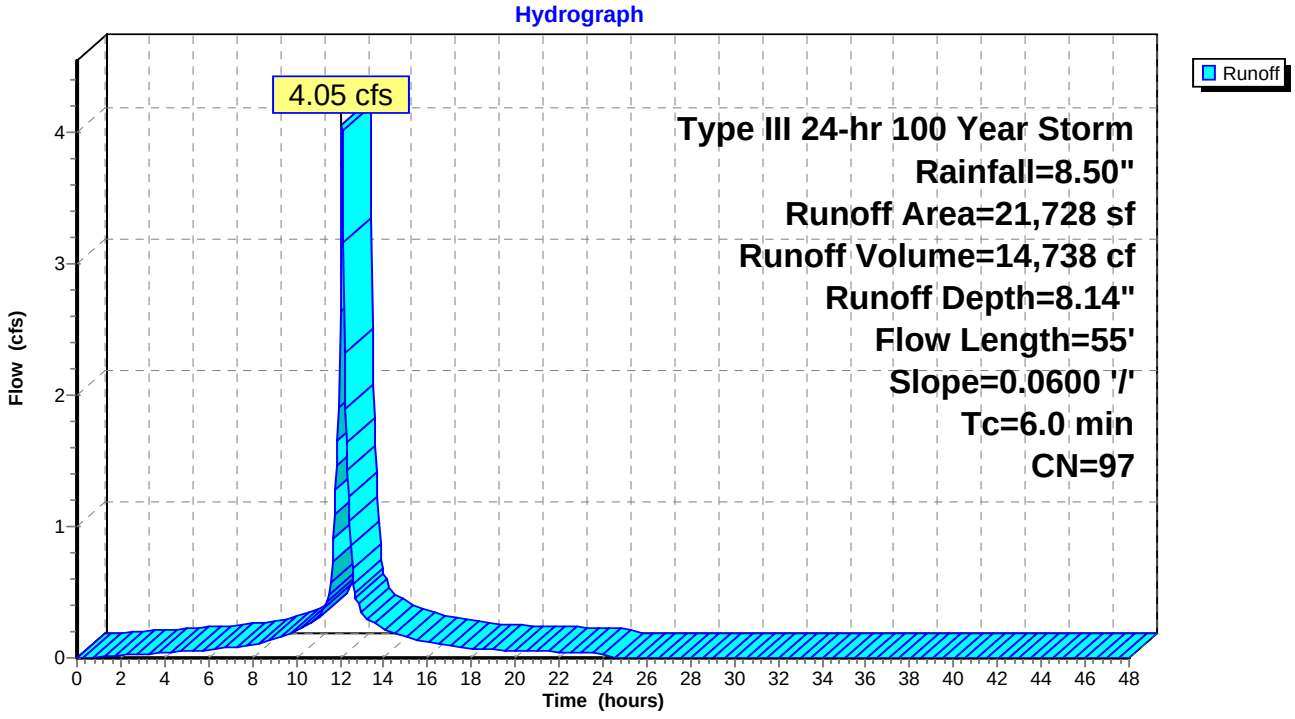
Runoff = 4.05 cfs @ 12.09 hrs, Volume= 14,738 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
9,495	98	Building
8,345	98	Hardscapes
2,835	98	Ledge
1,053	84	50-75% Grass cover, Fair, HSG D
21,728	97	Weighted Average
1,053		Pervious Area
20,675		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: EXIST. COND.



Subcatchment 2S: IMPERVIOUS

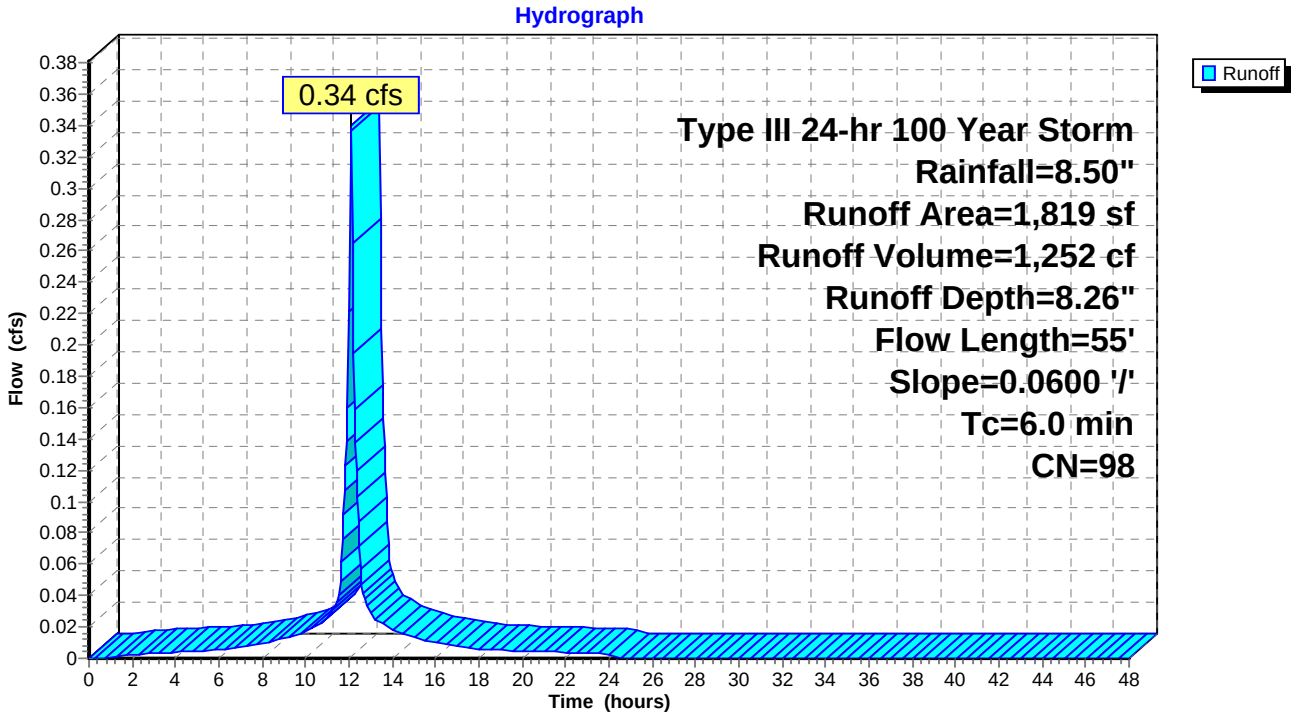
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 1,252 cf, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
1,020	98	Building
799	98	Drive & Ramp
1,819	98	Weighted Average
1,819		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS



Subcatchment 4S: IMPERVIOUS

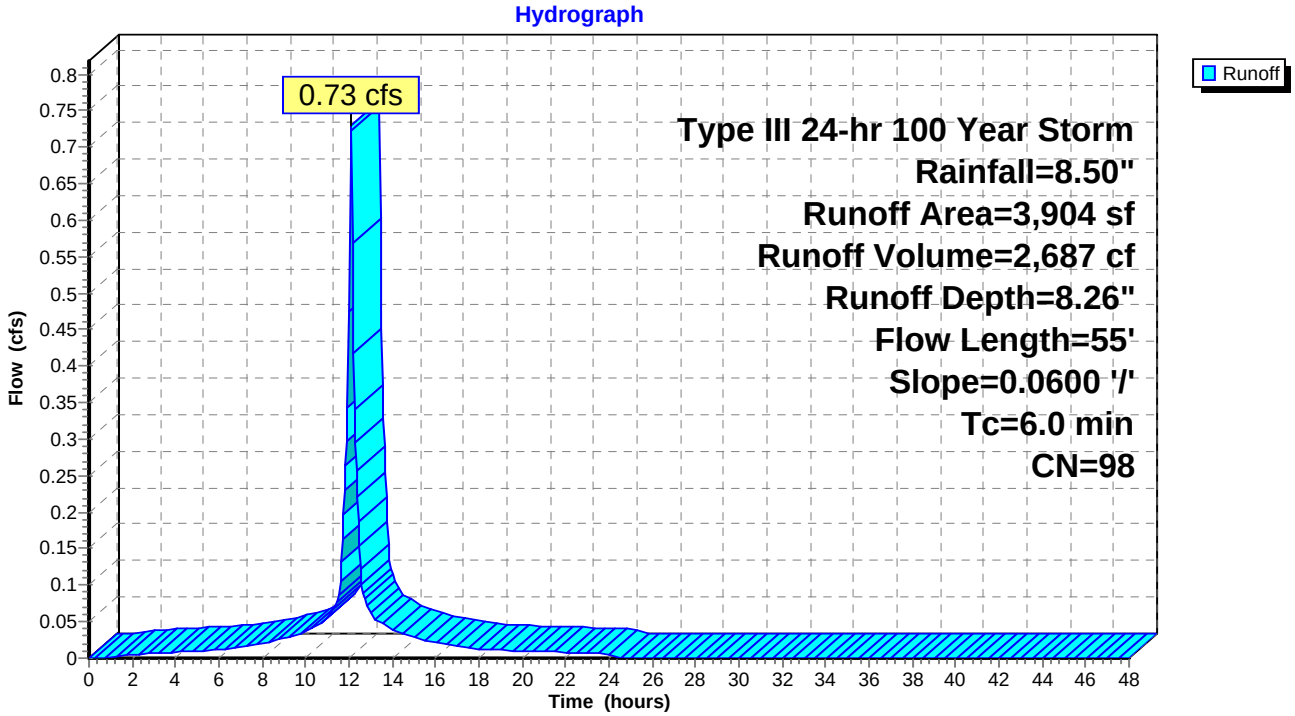
Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,687 cf, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
3,904	98	Building
3,904		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4S: IMPERVIOUS



Subcatchment 6S: IMPERVIOUS

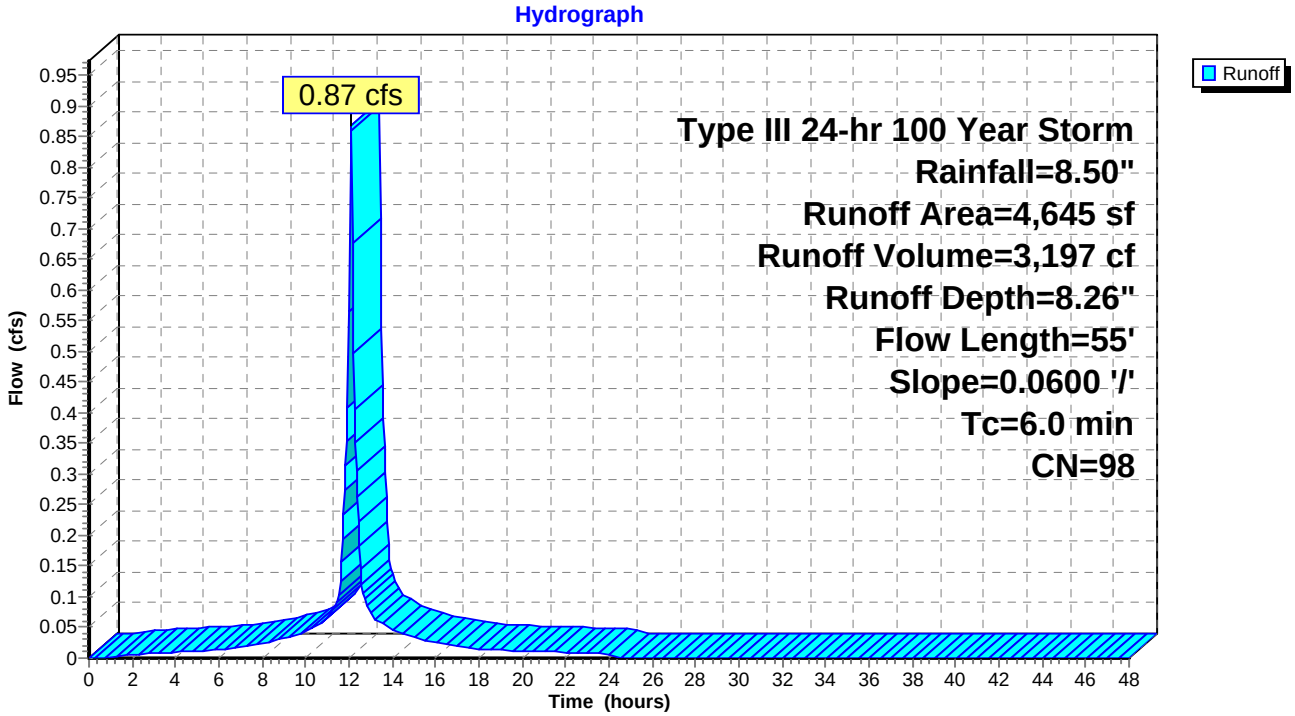
Runoff = 0.87 cfs @ 12.09 hrs, Volume= 3,197 cf, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
4,645	98	Building
4,645		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6S: IMPERVIOUS



Subcatchment 8S: IMPERVIOUS

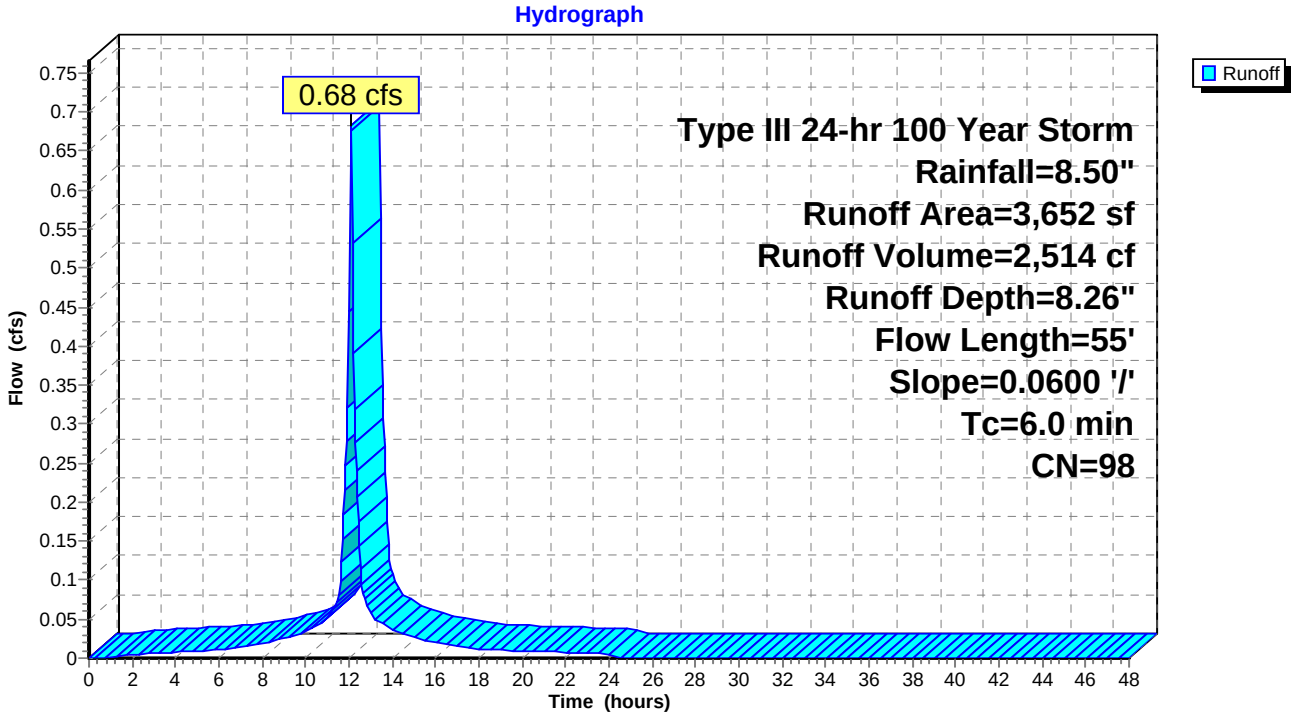
Runoff = 0.68 cfs @ 12.09 hrs, Volume= 2,514 cf, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
3,652	98	Drive & Ramp
3,652		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8S: IMPERVIOUS



Subcatchment 10S: OVERLAND

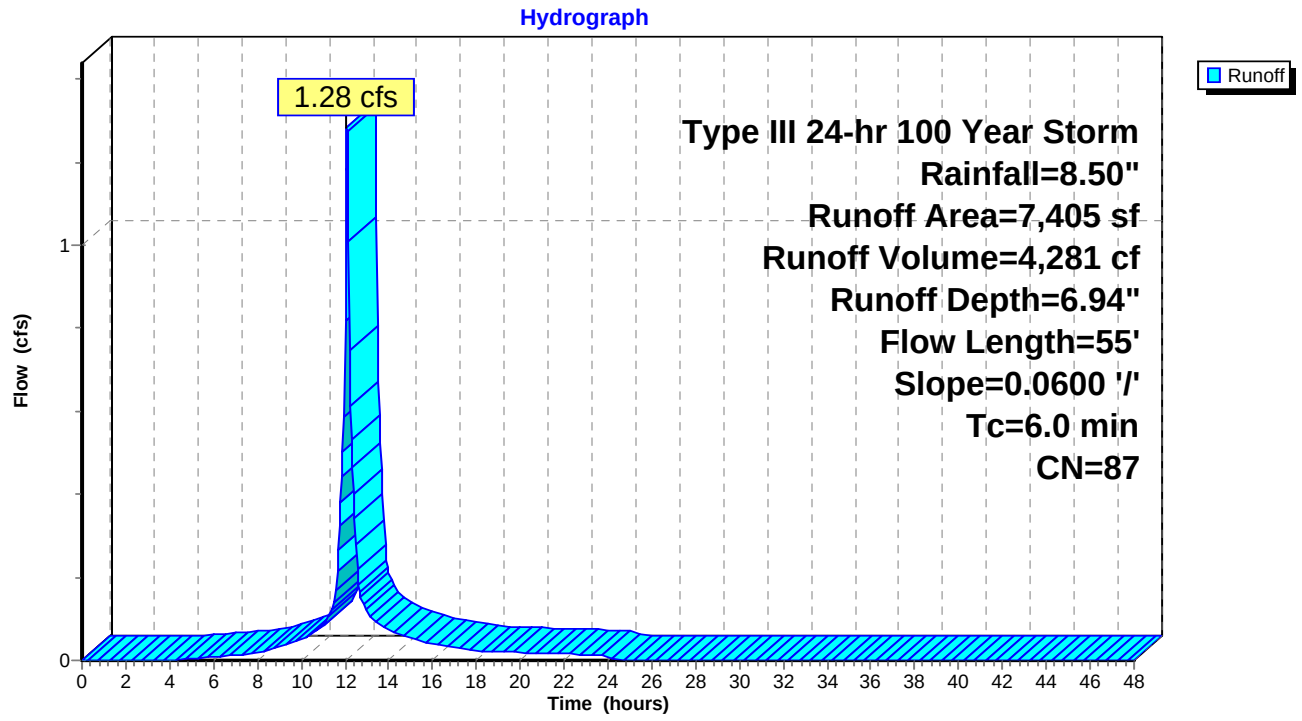
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 4,281 cf, Depth= 6.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
1,235	98	Parking
2,835	98	Ledge
3,335	74	Compost Amended Grass
7,405	87	Weighted Average
3,335		Pervious Area
4,070		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10S: OVERLAND



Pond 3P: CULTEC

Inflow Area = 1,819 sf, Inflow Depth = 8.26" for 100 Year Storm event
Inflow = 0.34 cfs @ 12.09 hrs, Volume= 1,252 cf
Outflow = 0.34 cfs @ 12.09 hrs, Volume= 1,169 cf, Atten= 1%, Lag= 0.0 min
Discarded = 0.00 cfs @ 4.90 hrs, Volume= 532 cf
Primary = 0.33 cfs @ 12.09 hrs, Volume= 637 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.02' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 221.5 min calculated for 1,169 cf (93% of inflow)
Center-of-Mass det. time= 184.2 min (924.7 - 740.5)

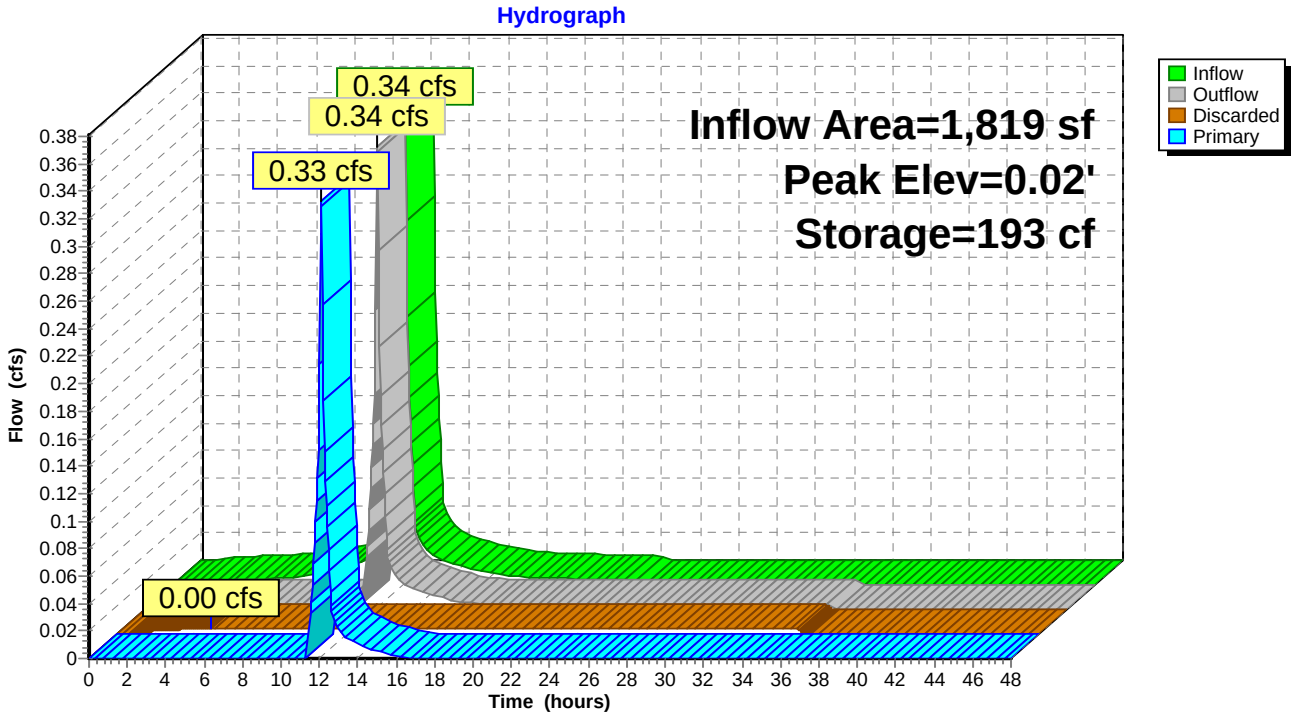
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 4.90 hrs HW=-4.95' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.26 cfs @ 12.09 hrs HW=0.02' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.48 fps)
└**3=Orifice/Grate** (Weir Controls 0.26 cfs @ 0.46 fps)

Pond 3P: CULTEC



Pond 5P: CULTEC

Inflow Area = 3,904 sf, Inflow Depth = 8.26" for 100 Year Storm event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 2,687 cf
Outflow = 0.72 cfs @ 12.08 hrs, Volume= 2,689 cf, Atten= 2%, Lag= 0.0 min
Discarded = 0.00 cfs @ 2.05 hrs, Volume= 560 cf
Primary = 0.71 cfs @ 12.08 hrs, Volume= 2,129 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 7
Peak Elev= 0.88' @ 12.08 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 99.5 min calculated for 2,687 cf (100% of inflow)
Center-of-Mass det. time= 100.7 min (841.2 - 740.5)

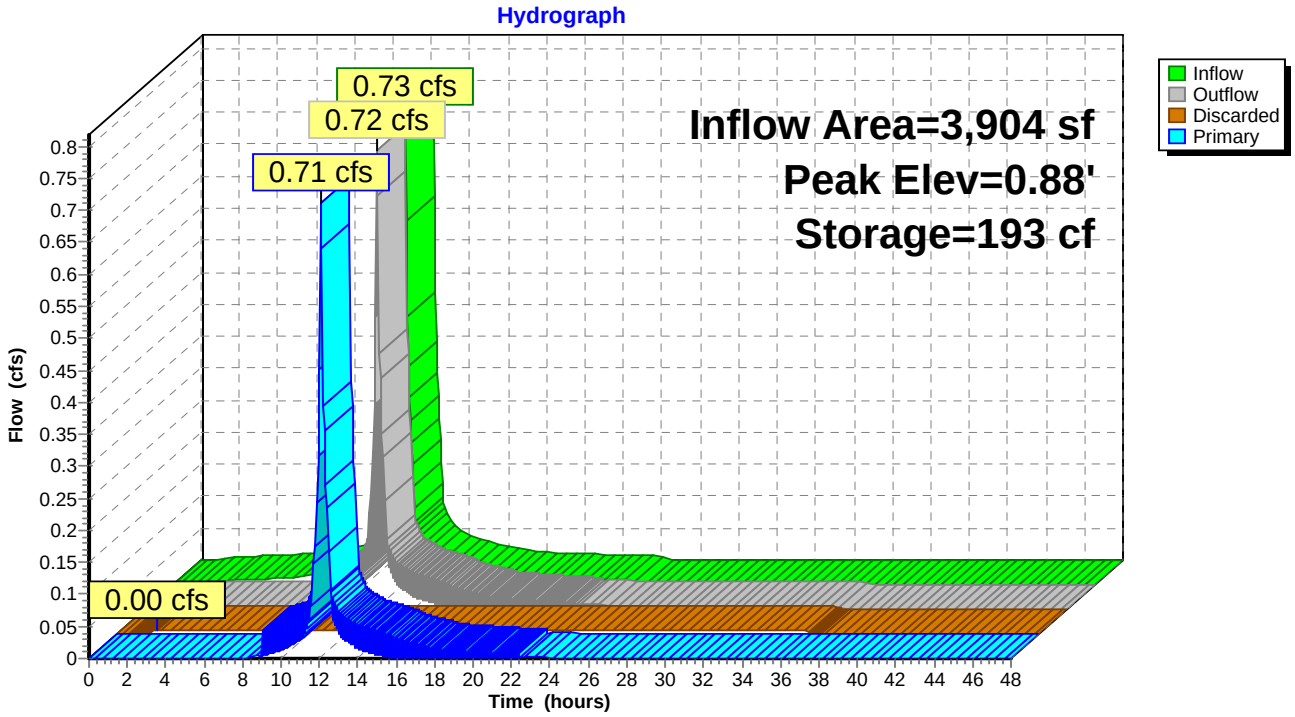
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 2.05 hrs HW=-4.95' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.70 cfs @ 12.08 hrs HW=0.85' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.70 cfs @ 3.99 fps)

Pond 5P: CULTEC



Pond 7P: CULTEC

Inflow Area = 4,645 sf, Inflow Depth = 8.26" for 100 Year Storm event
Inflow = 0.87 cfs @ 12.09 hrs, Volume= 3,197 cf
Outflow = 0.86 cfs @ 12.09 hrs, Volume= 2,706 cf, Atten= 1%, Lag= 0.0 min
Discarded = 0.00 cfs @ 1.70 hrs, Volume= 562 cf
Primary = 0.85 cfs @ 12.09 hrs, Volume= 2,144 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.63' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 136.8 min calculated for 2,703 cf (85% of inflow)
Center-of-Mass det. time= 71.2 min (811.7 - 740.5)

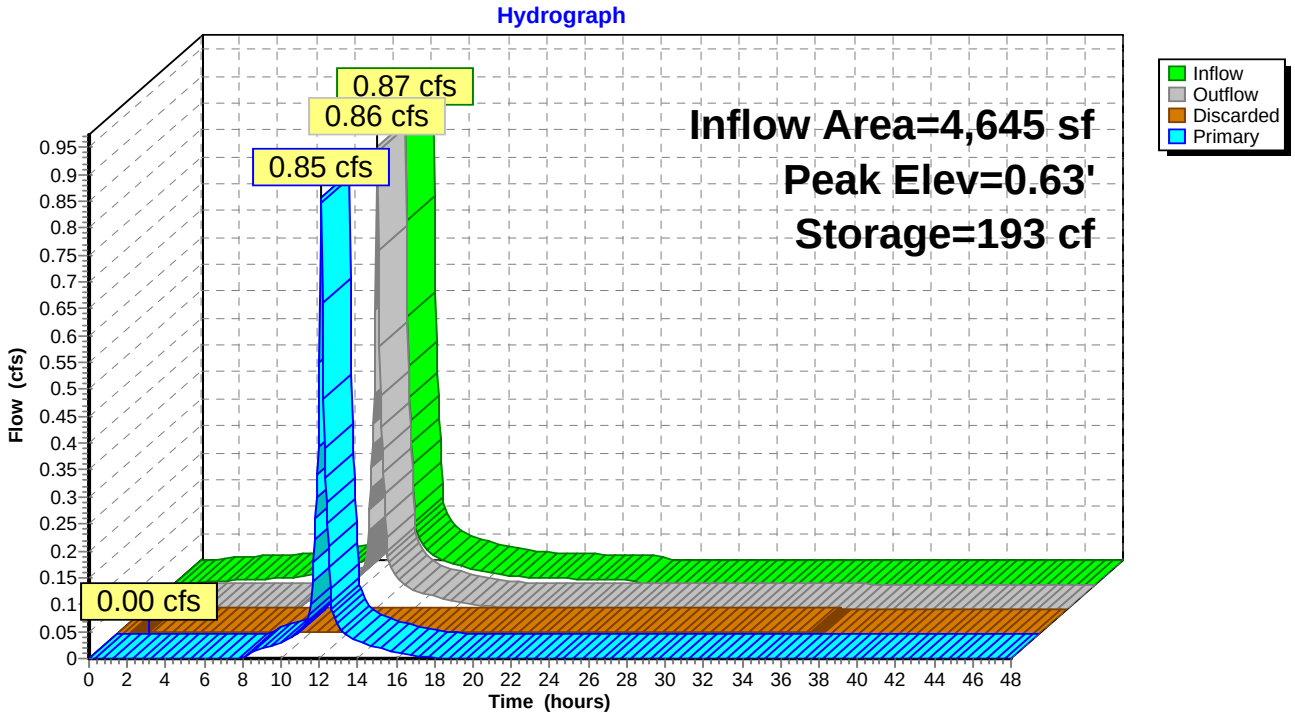
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 1.70 hrs HW=-4.95' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.83 cfs @ 12.09 hrs HW=0.60' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.83 cfs @ 3.18 fps)

Pond 7P: CULTEC



Pond 9P: CULTEC

Inflow Area = 3,652 sf, Inflow Depth = 8.26" for 100 Year Storm event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 2,514 cf
Outflow = 0.68 cfs @ 12.09 hrs, Volume= 2,599 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 2.20 hrs, Volume= 559 cf
Primary = 0.68 cfs @ 12.09 hrs, Volume= 2,040 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 0.03' @ 12.09 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 71.9 min calculated for 2,512 cf (100% of inflow)
Center-of-Mass det. time= 111.4 min (851.8 - 740.5)

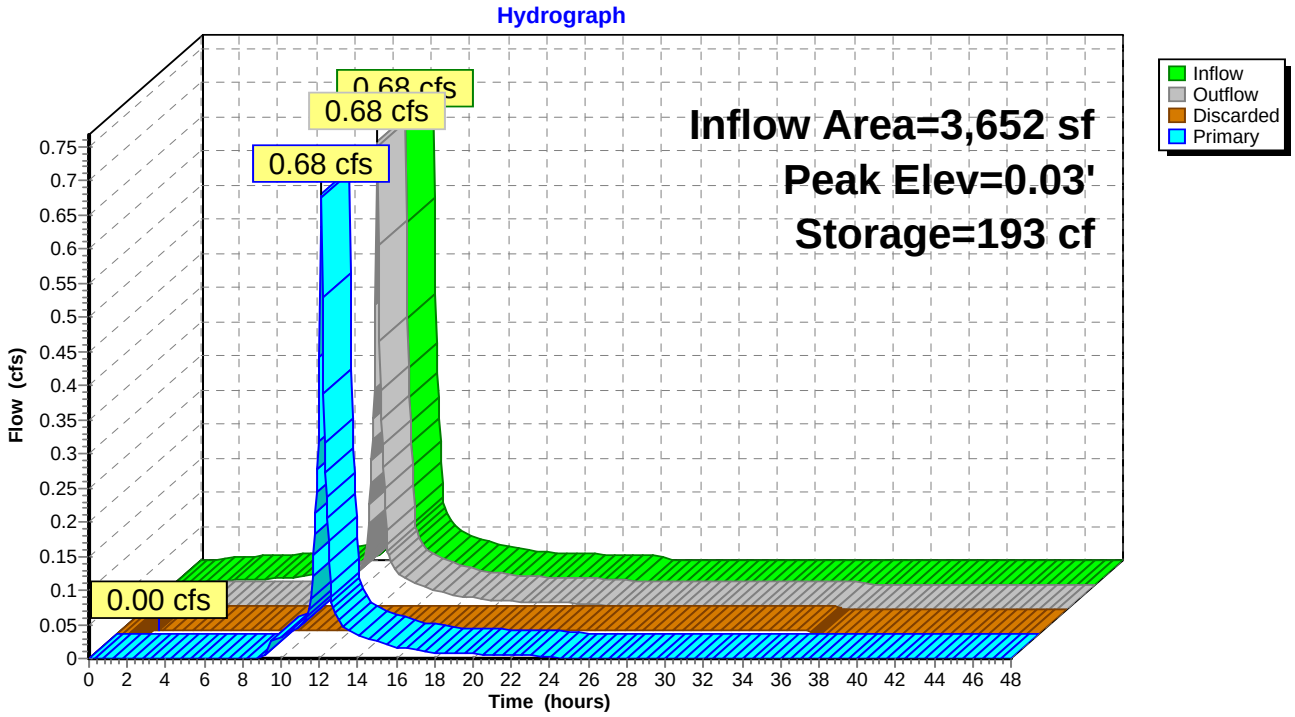
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 2.20 hrs HW=-4.95' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=0.03' (Free Discharge)
↑└**2=Orifice/Grate** (Weir Controls 0.53 cfs @ 0.59 fps)

Pond 9P: CULTEC

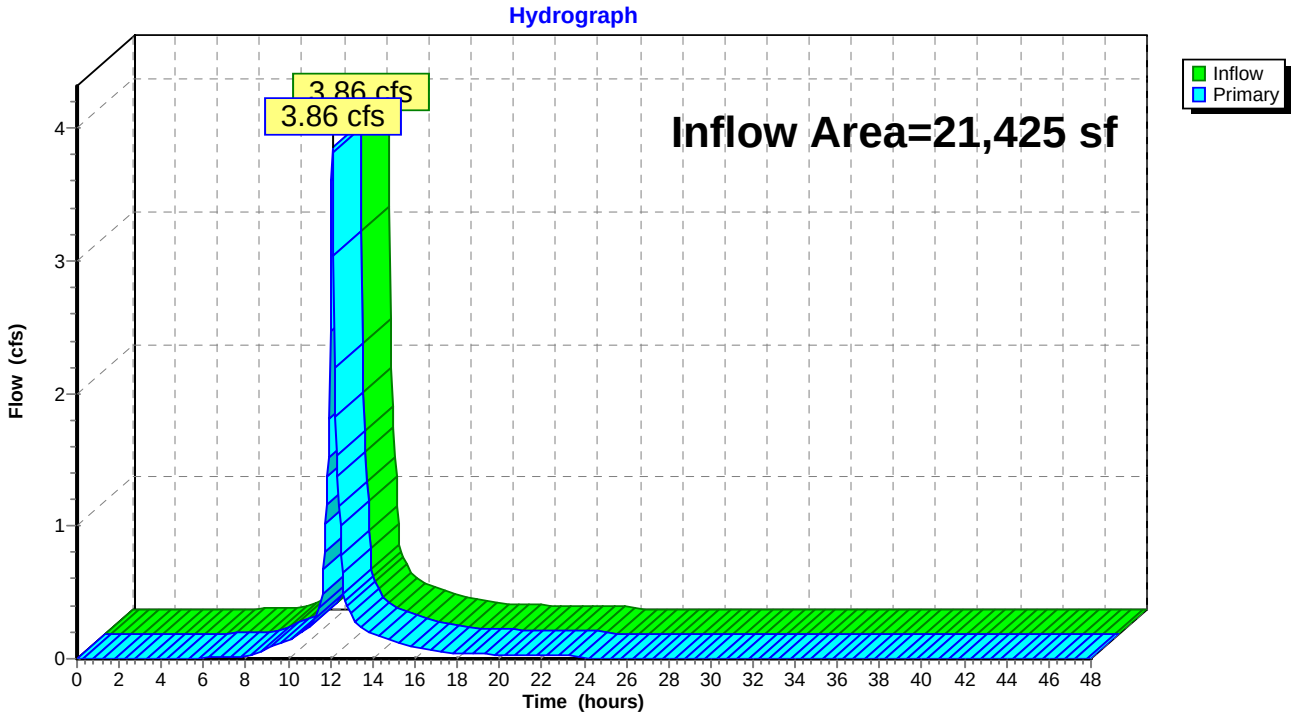


Link 11L: (new Link)

Inflow Area = 21,425 sf, Inflow Depth = 6.29" for 100 Year Storm event
Inflow = 3.86 cfs @ 12.09 hrs, Volume= 11,231 cf
Primary = 3.86 cfs @ 12.09 hrs, Volume= 11,231 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 11L: (new Link)



Subcatchment 1S: EXIST. COND.

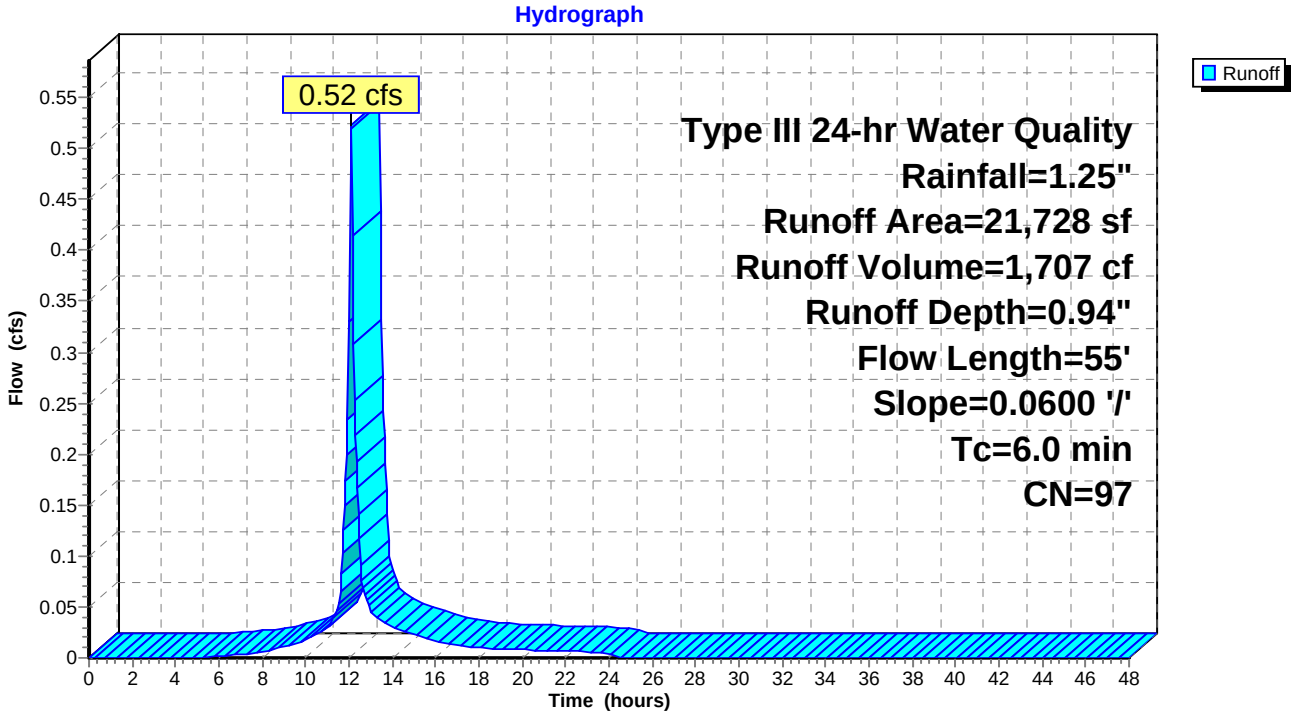
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 1,707 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.25"

Area (sf)	CN	Description
9,495	98	Building
8,345	98	Hardscapes
2,835	98	Ledge
1,053	84	50-75% Grass cover, Fair, HSG D
21,728	97	Weighted Average
1,053		Pervious Area
20,675		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: EXIST. COND.



Subcatchment 2S: IMPERVIOUS

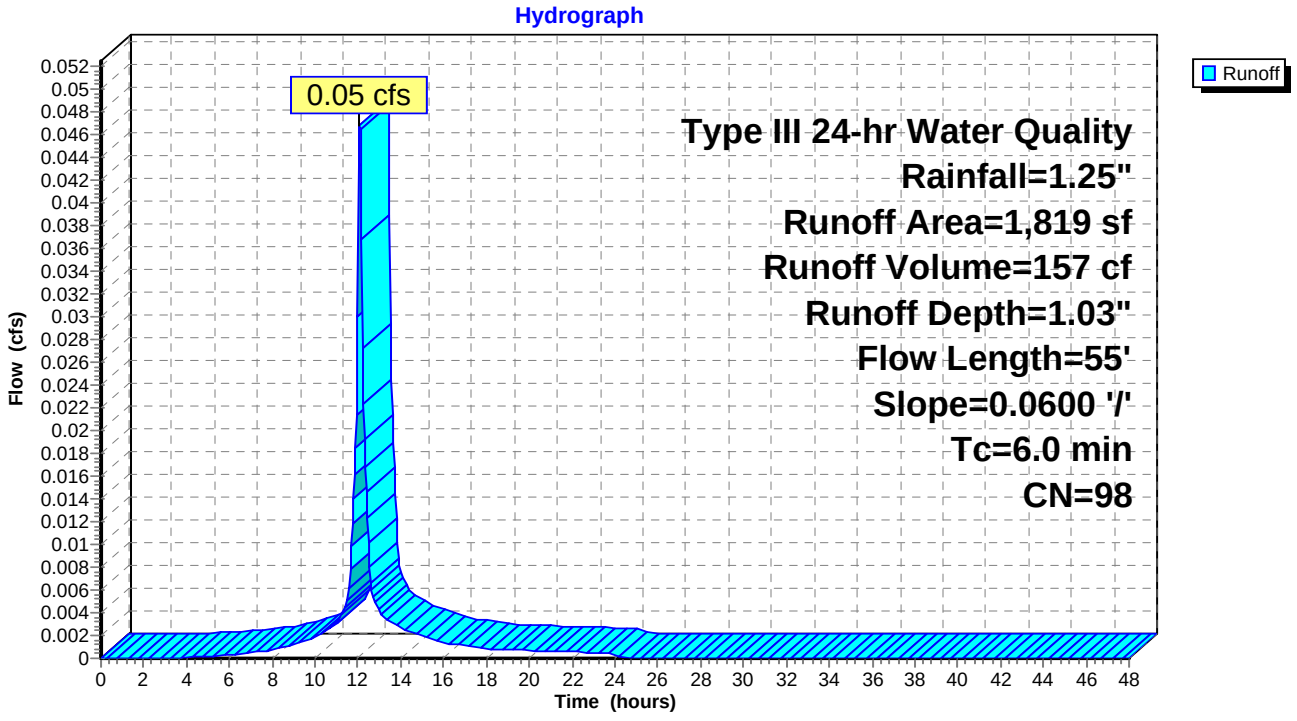
Runoff = 0.05 cfs @ 12.09 hrs, Volume= 157 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.25"

Area (sf)	CN	Description
1,020	98	Building
799	98	Drive & Ramp
1,819	98	Weighted Average
1,819		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS



Subcatchment 4S: IMPERVIOUS

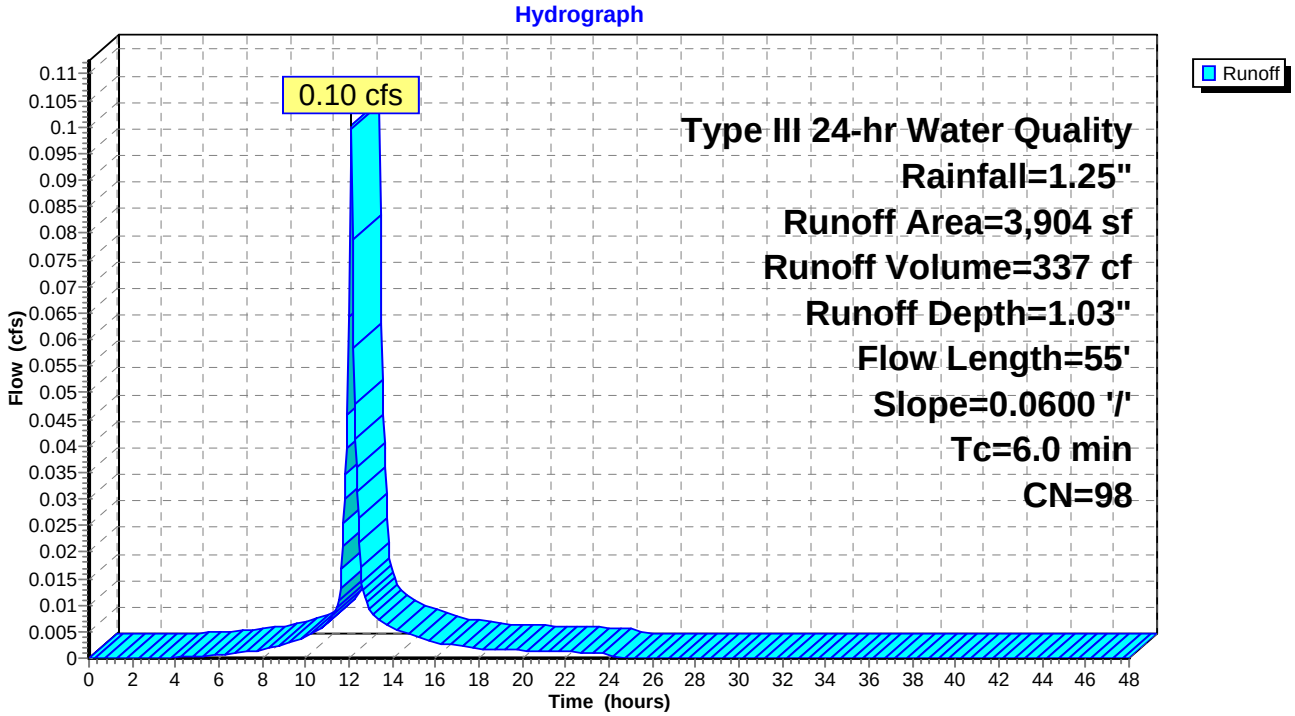
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 337 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.25"

Area (sf)	CN	Description
3,904	98	Building
3,904		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4S: IMPERVIOUS



Subcatchment 6S: IMPERVIOUS

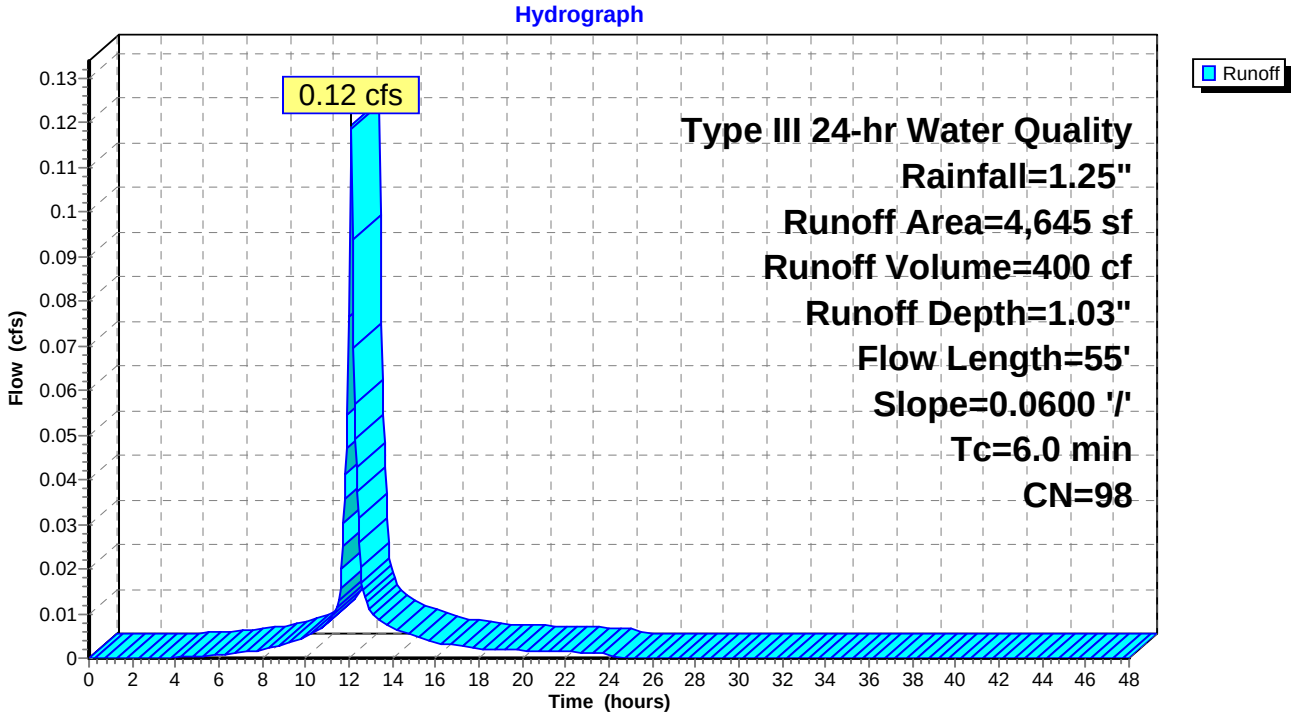
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 400 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.25"

Area (sf)	CN	Description
4,645	98	Building
4,645		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6S: IMPERVIOUS



Subcatchment 8S: IMPERVIOUS

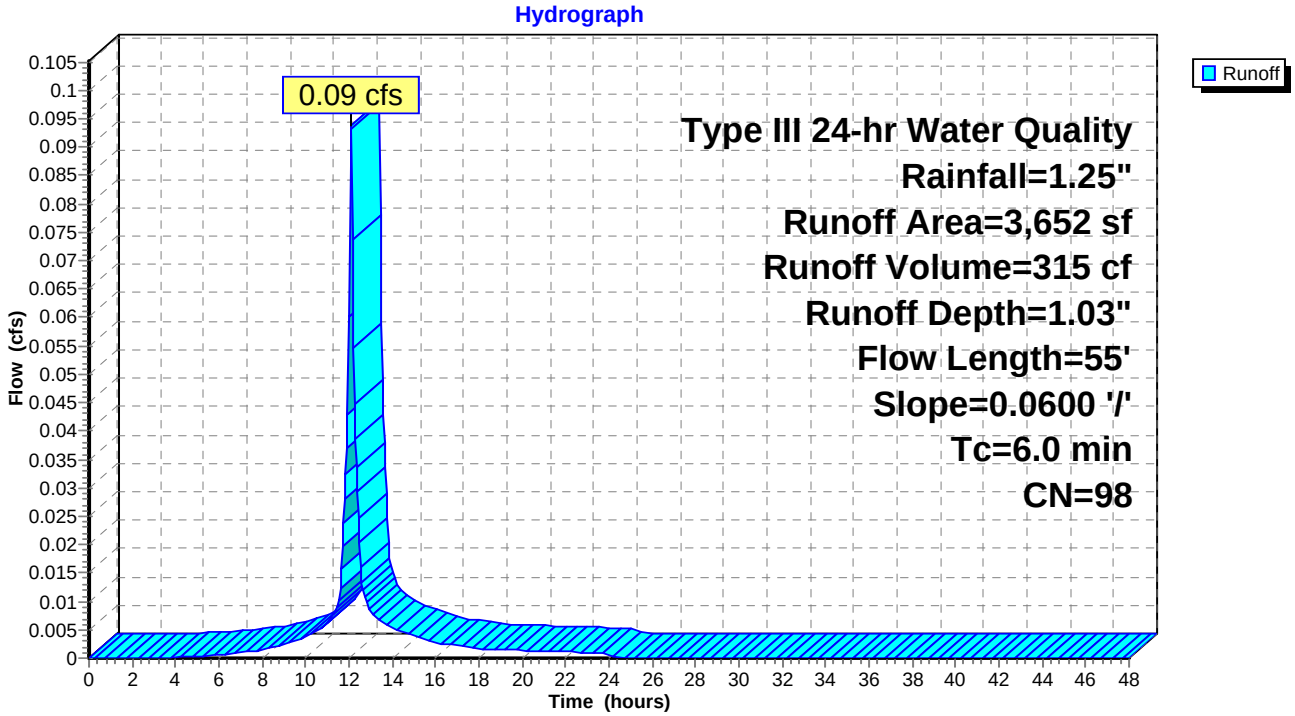
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 315 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.25"

Area (sf)	CN	Description
3,652	98	Drive & Ramp
3,652		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8S: IMPERVIOUS



Subcatchment 10S: OVERLAND

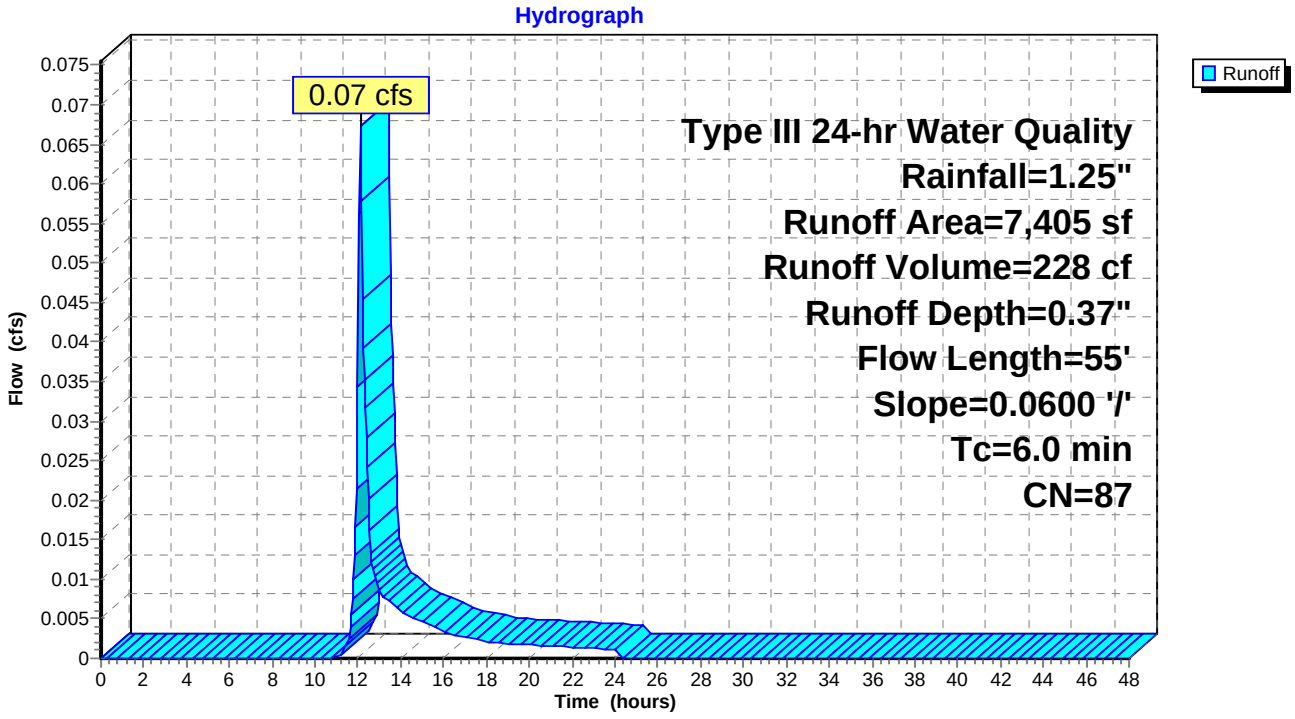
Runoff = 0.07 cfs @ 12.10 hrs, Volume= 228 cf, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.25"

Area (sf)	CN	Description
1,235	98	Parking
2,835	98	Ledge
3,335	74	Compost Amended Grass
7,405	87	Weighted Average
3,335		Pervious Area
4,070		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	55	0.0600	1.95		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.40"
0.5	55	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10S: OVERLAND



Pond 3P: CULTEC

Inflow Area = 1,819 sf, Inflow Depth = 1.03" for Water Quality event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 157 cf
Outflow = 0.00 cfs @ 11.55 hrs, Volume= 157 cf, Atten= 90%, Lag= 0.0 min
Discarded = 0.00 cfs @ 11.55 hrs, Volume= 157 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 / 6
Peak Elev= -3.93' @ 12.93 hrs Surf.Area= 96 sf Storage= 58 cf

Plug-Flow detention time= 99.0 min calculated for 157 cf (100% of inflow)
Center-of-Mass det. time= 99.0 min (879.7 - 780.7)

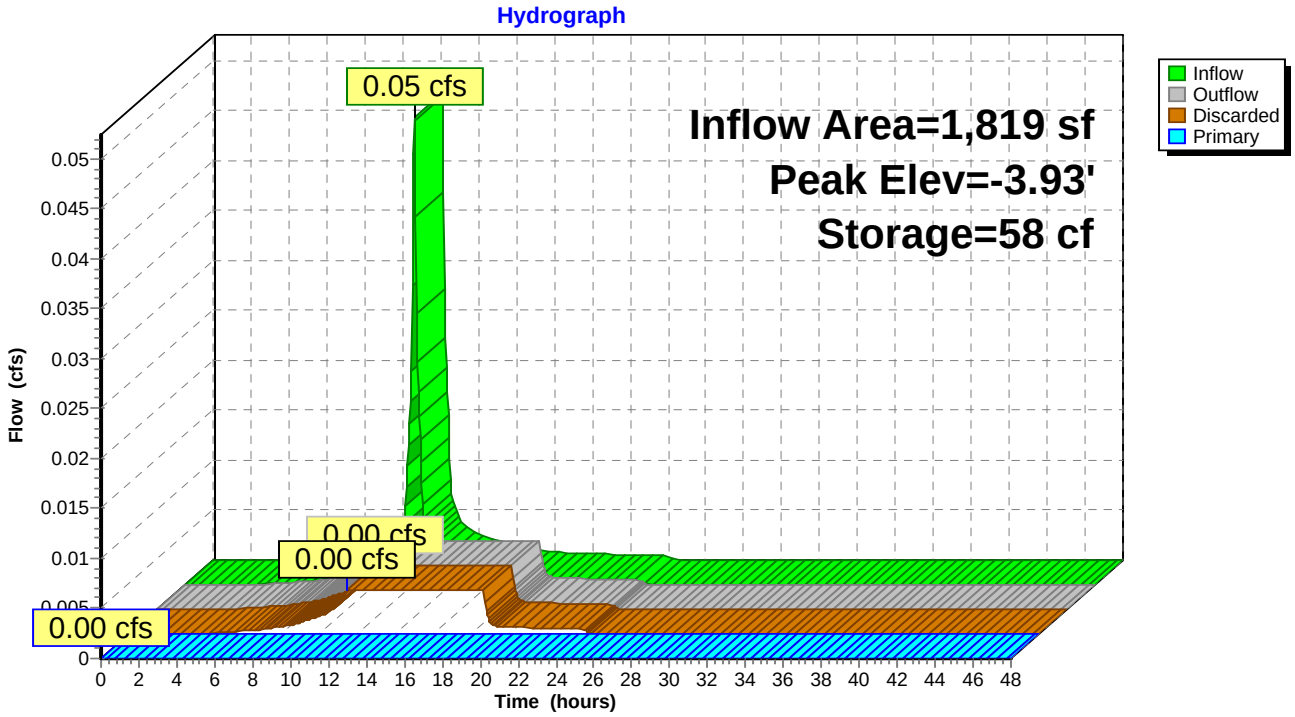
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 11.55 hrs HW=-4.94' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=-5.00' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: CULTEC



Pond 5P: CULTEC

Inflow Area = 3,904 sf, Inflow Depth = 1.03" for Water Quality event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 337 cf
Outflow = 0.00 cfs @ 10.40 hrs, Volume= 337 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.00 cfs @ 10.40 hrs, Volume= 337 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 / 7
Peak Elev= -2.03' @ 14.83 hrs Surf.Area= 96 sf Storage= 170 cf

Plug-Flow detention time= 342.6 min calculated for 336 cf (100% of inflow)
Center-of-Mass det. time= 342.6 min (1,123.3 - 780.7)

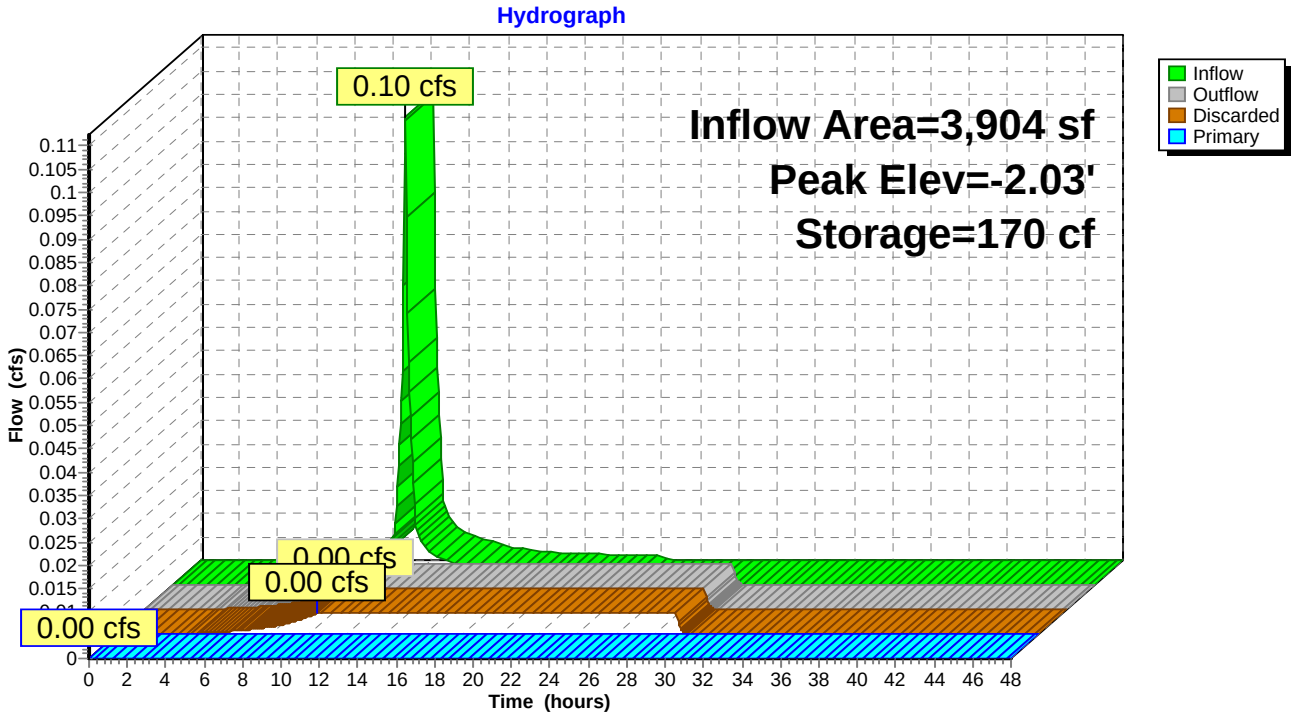
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 10.40 hrs HW=-4.95' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=-5.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 5P: CULTEC



Pond 7P: CULTEC

Inflow Area = 4,645 sf, Inflow Depth = 1.03" for Water Quality event
Inflow = 0.12 cfs @ 12.09 hrs, Volume= 400 cf
Outflow = 0.01 cfs @ 12.87 hrs, Volume= 394 cf, Atten= 90%, Lag= 47.0 min
Discarded = 0.00 cfs @ 10.00 hrs, Volume= 377 cf
Primary = 0.01 cfs @ 12.87 hrs, Volume= 18 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 6
Peak Elev= 0.02' @ 12.85 hrs Surf.Area= 96 sf Storage= 193 cf

Plug-Flow detention time= 389.9 min calculated for 394 cf (98% of inflow)
Center-of-Mass det. time= 380.3 min (1,161.1 - 780.7)

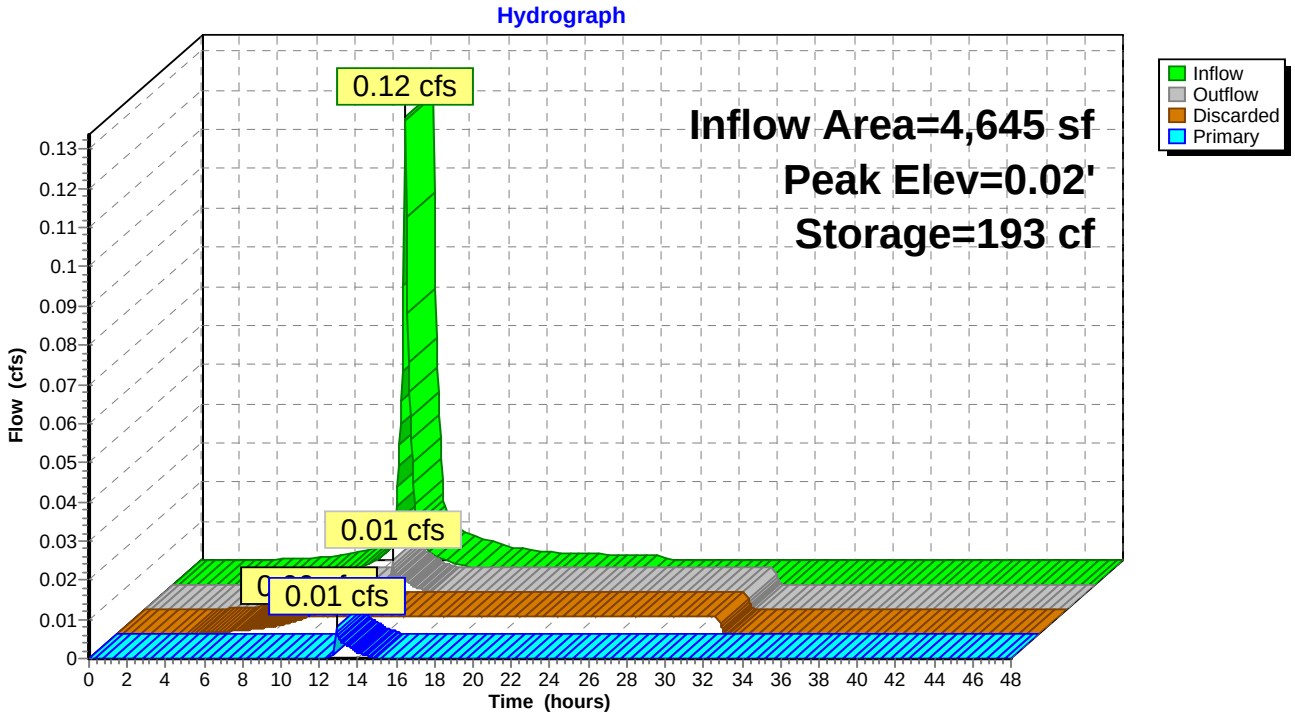
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 10.00 hrs HW=-4.95' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 12.87 hrs HW=0.02' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.51 fps)

Pond 7P: CULTEC



Pond 9P: CULTEC

Inflow Area = 3,652 sf, Inflow Depth = 1.03" for Water Quality event
Inflow = 0.09 cfs @ 12.09 hrs, Volume= 315 cf
Outflow = 0.00 cfs @ 10.50 hrs, Volume= 315 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.00 cfs @ 10.50 hrs, Volume= 315 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 / 4
Peak Elev= -2.37' @ 14.59 hrs Surf.Area= 96 sf Storage= 154 cf

Plug-Flow detention time= 309.4 min calculated for 315 cf (100% of inflow)
Center-of-Mass det. time= 309.3 min (1,090.0 - 780.7)

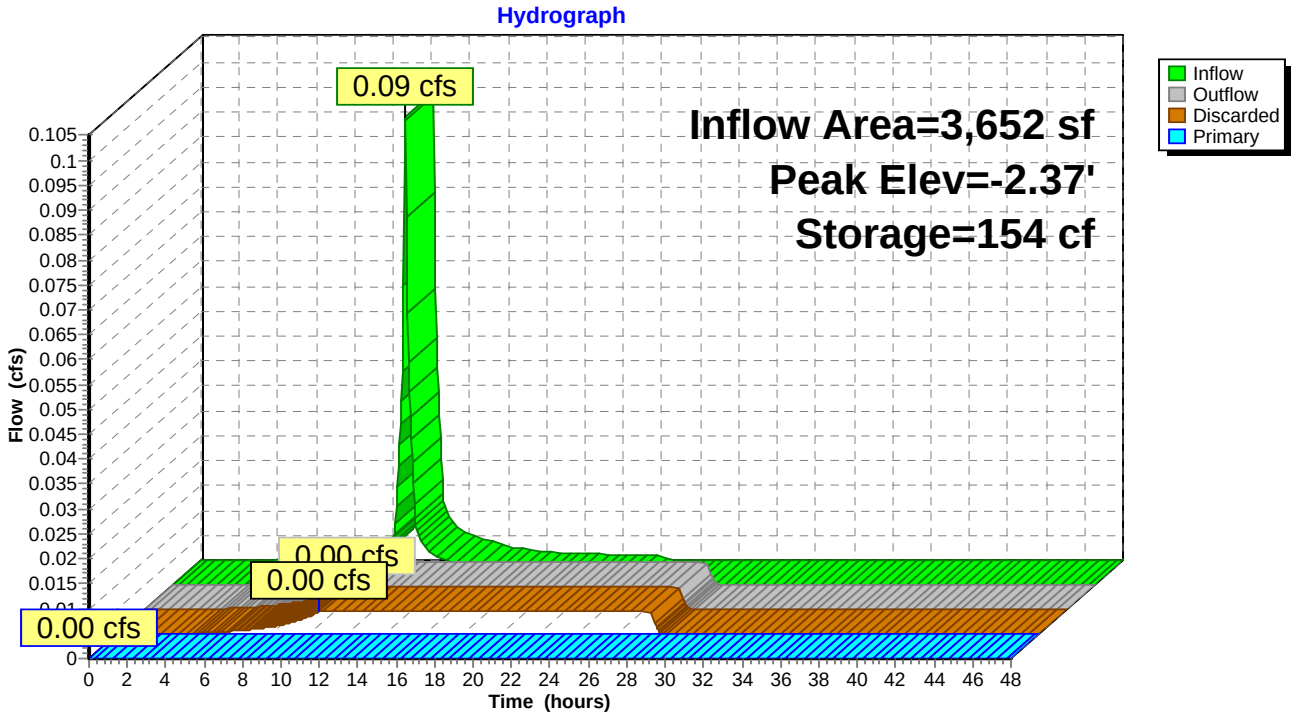
Volume	Invert	Avail.Storage	Storage Description
#1	-4.50'	93 cf	**47.8"W x 30.0"H x 6.25'L Cultec R-330** x 2 Inside #2
#2	-5.00'	100 cf	**6.00'W x 16.00'L x 3.58'H Prismatoid** 344 cf Overall - 93 cf Embedded = 251 cf x 40.0% Voids
		193 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**2.00' x 12.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.00 cfs @ 10.50 hrs HW=-4.95' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=-5.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: CULTEC

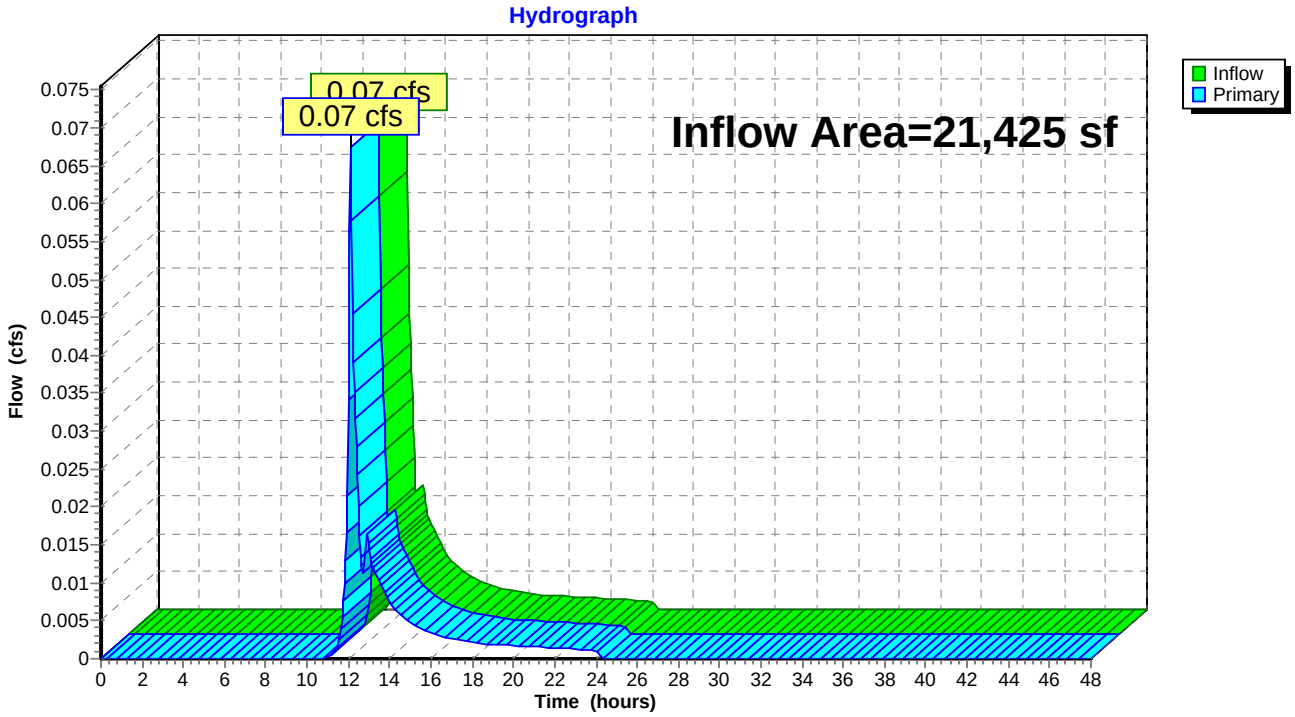


Link 11L: (new Link)

Inflow Area = 21,425 sf, Inflow Depth = 0.14" for Water Quality event
Inflow = 0.07 cfs @ 12.10 hrs, Volume= 246 cf
Primary = 0.07 cfs @ 12.10 hrs, Volume= 246 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 11L: (new Link)



Appendix 'D'

TSS Calculations

(Attached)

Infiltrator

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Infiltration Trench

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

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

Project: **120 Nantasket Ave.**

Prepared By: **Atlantic Coast Eng.**

Date: **12/5/22**

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

Appendix 'E'

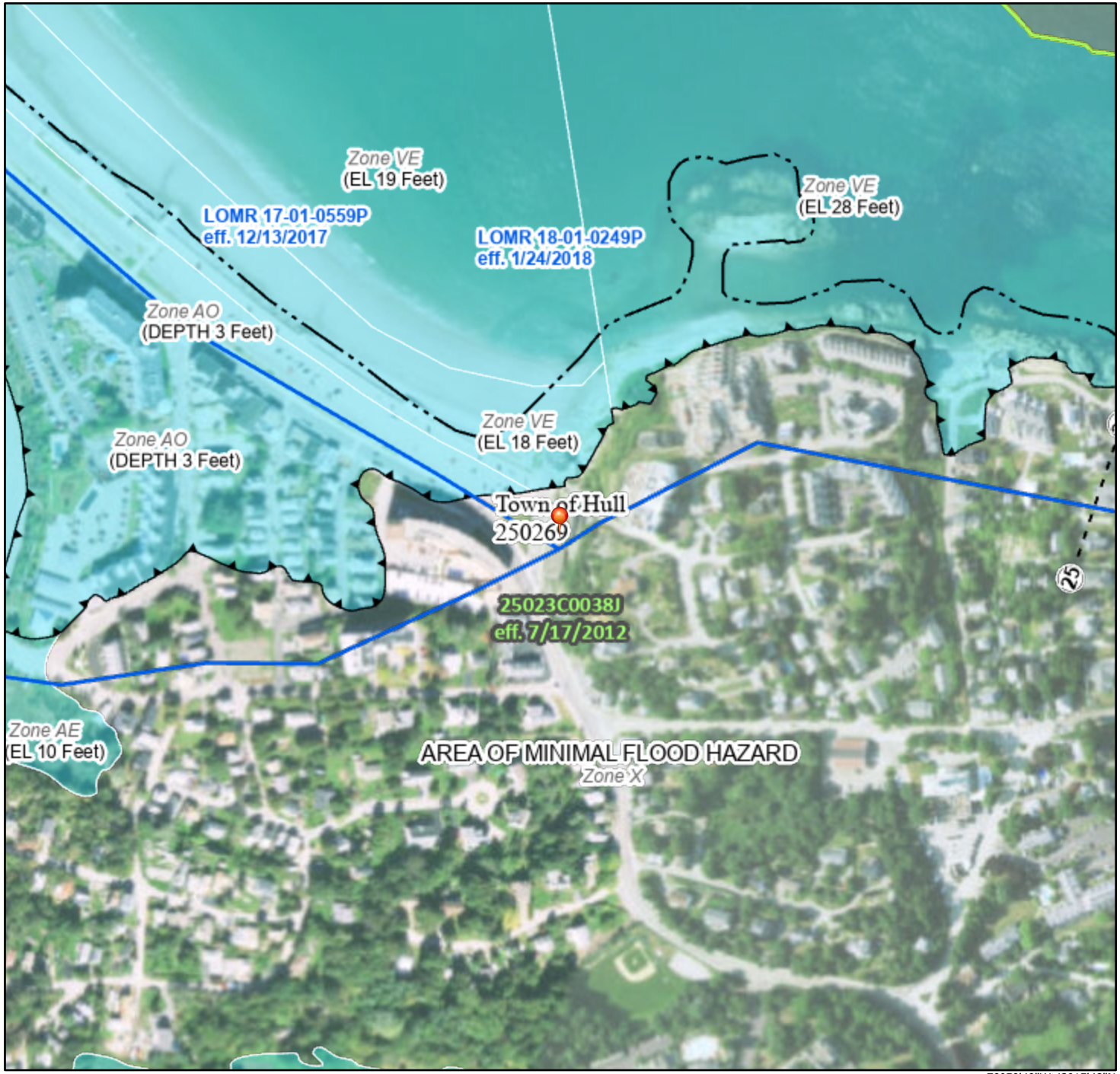
FEMA FIRMette

(Attached)

National Flood Hazard Layer FIRMette

FEMA

70°51'18"W 42°16'14"N



70°50'40"W 42°15'48"N

Feet 1:6,000

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

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/16/2022 at 9:53 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Appendix 'F'

Illicit Discharge

Compliance Statement

(Attached)

Illicit Discharge Compliance Statement

Responsibility:

The Owner is responsible for ultimate compliance with all provisions of the Massachusetts Stormwater Management Policy, the USEPA NPDES Construction General Permit (if required) and responsible for identifying and eliminating illicit discharges (as defined by the USEPA).

OWNER NAME: _____

ADDRESS: _____

_____

_____

TEL. NUMBER: _____

Engineer's Compliance Statement:

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

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

For a redevelopment project (if applicable), all actions taken to identify and remove illicit discharges, including without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system are documented and included with this statement.

Appendix 'G'

Zone II Map

(Attached)

Z2	ZONE 2 MAP	ATLANTIC COAST ENGINEERING		
	AT: 120 NANTASKET AVENUE	88 FRONT ST., SUITE 22, SCITUATE, MA 02066		
	HULL, MA	N.T.S.	(781)378-2593	DATE: 12/5/22

Appendix 'H'

IWPA Map

(Attached)

IWPA	IWPA MAP	ATLANTIC COAST ENGINEERING		
	AT: 120 NANTASKET AVENUE	88 FRONT ST., SUITE 22, SCITUATE, MA 02066		
	HULL, MA	N.T.S.	(781)378-2593	DATE: 12/5/22

Appendix 'I'

Priority/Estimated Habitats of

Rare Wildlife/Species Map

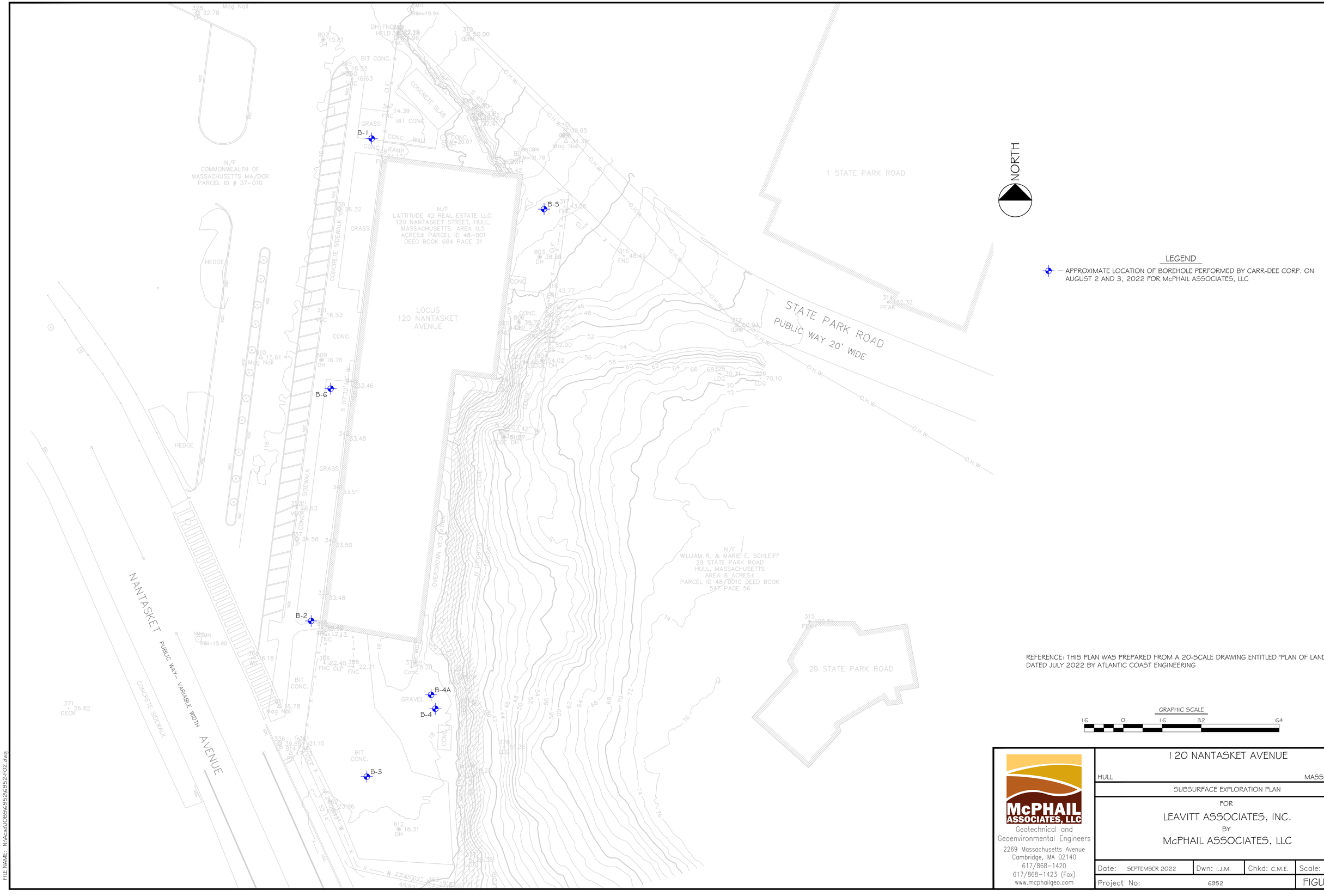
(Attached)

NHESP	NHESP MAP	ATLANTIC COAST ENGINEERING		
	AT: 120 NANTASKET AVENUE	88 FRONT ST., SUITE 22, SCITUATE, MA 02066		
	HULL, MA	N.T.S.	(781)378-2593	DATE: 12/5/22

Appendix 'J'

Boring Logs

(Attached)



NORTH

LEGEND

— APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY CARR-DEE CORP. ON AUGUST 2 AND 3, 2022 FOR McPHAIL ASSOCIATES, LLC

REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "PLAN OF LAND" DATED JULY 2022 BY ATLANTIC COAST ENGINEERING

GRAPHIC SCALE

16 0 16 32 64

McPHAIL ASSOCIATES, LLC
Geotechnical and
Geoenvironmental Engineers
2269 Massachusetts Avenue
Cambridge, MA 02140
617/868-1420
617/868-1423 (Fax)
www.mcphailgeo.com

120 NANTASKET AVENUE

HULL MASSACHUSETTS

SUBSURFACE EXPLORATION PLAN

FOR

LEAVITT ASSOCIATES, INC.

BY

McPHAIL ASSOCIATES, LLC

Date: SEPTEMBER 2022	Dwn: I.J.M.	Chkd: C.M.E.	Scale: 1/16" = 1'-0"
Project No: 6952			FIGURE 2

FILE NAME: N:\Acad\JOBS\6952\6952-FIG2.dwg

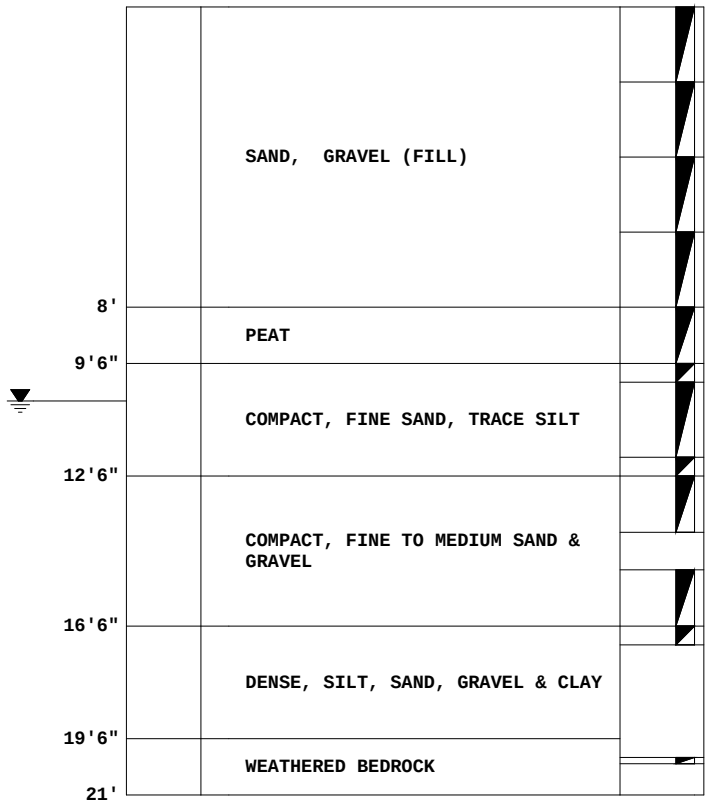
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: LEAVITT ASSOC., INC., 1514 BEACON ST., BROOKLINE, MA Date: 8-4-2022 Job No.: 20220106

Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 1



S#1, 0' to 2' (10-5-8-5) RECOVERED 11 in.

S#2, 2' to 4' (5-4-5-6) RECOVERED 12 in.

S#3, 4' to 6' (6-6-6-6) RECOVERED 14 in.

S#4, 6' to 8' (3-3-3-3) RECOVERED 14 in.

S#5, 8' to 9'6" (2-1-1) RECOVERED 12 in.

S#5A, 9'6" to 10' (5) RECOVERED 6 in.

S#6, 10' to 12' (5-6-8-11) RECOVERED 16 in.

S#7, 12' to 12'6" (6) RECOVERED 6 in.

S#7A, 12'6" to 14' (13-15-14) RECOVERED 10 in.

S#8, 15' to 16'6" (4-6-9) RECOVERED 18 in.

S#8A, 16'6" to 17' (23) RECOVERED 4 in.

S#9, 20' to 20'2" (100/2") RECOVERED 2 in.

WATER LEVEL 10'6"
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 21'0"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-2-2022

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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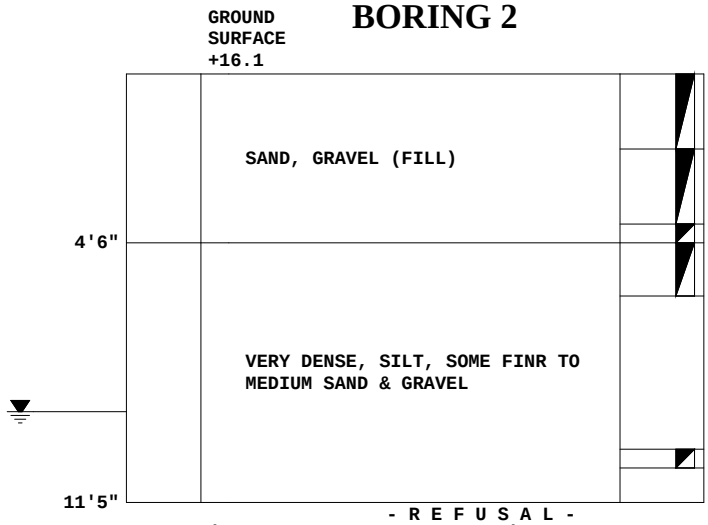
Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 2



S#1, 0' to 2' (3-6-6-12) RECOVERED 16 in.

S#2, 2' to 4' (6-12-11-16) RECOVERED 16 in.

S#3, 4' to 4'6" (20) RECOVERED 6 in.

S#3A, 4'6" to 5'11" (28-43-100/5") RECOVERED 10 in.

S#4, 10' to 10'6" (109) RECOVERED 6 in.

S#5, 11'5" to 11'5" (100/0") RECOVERED 0 in.

WATER LEVEL 9'
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 11'5"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-3-2022

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

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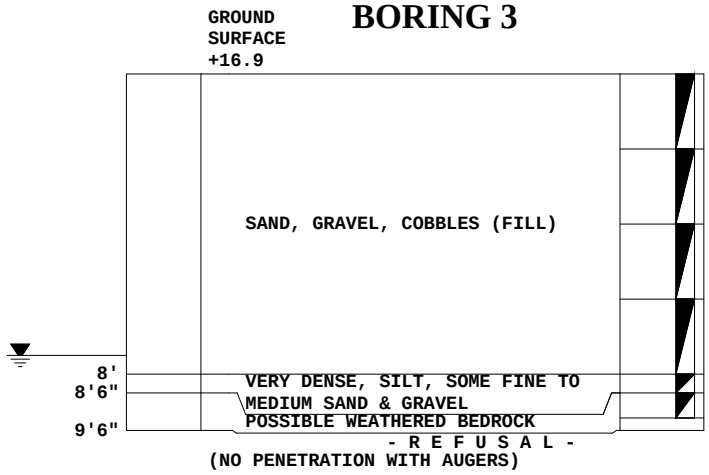
To: LEAVITT ASSOC., INC., 1514 BEACON ST., BROOKLINE, MA Date: 8-4-2022 Job No.: 20220106

Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 3



S#1, 0' to 2' (2-8-16-11) RECOVERED 17 in.

S#2, 2' to 4' (6-4-4-3) RECOVERED 16 in.

S#3, 4' to 6' (4-4-5-6) RECOVERED 11 in.

S#4, 6' to 8' (5-3-4-6) RECOVERED 8 in.

S#5, 8' to 8'6" (55) RECOVERED 4 in.

S#5A, 8'6" to 9'2" (112-100/2") RECOVERED 6 in.

WATER LEVEL 7'6"
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 9'6"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-3-2022

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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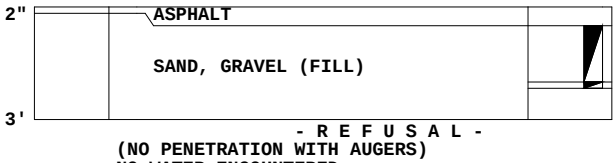
To: LEAVITT ASSOC., INC., 1514 BEACON ST., BROOKLINE, MA Date: 8-4-2022 Job No.: 20220106

Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 4

GROUND SURFACE
+16.7



S#1, 6" to 2' (5-15-31) RECOVERED 10 in.

S#2, 2' to 2'2" (100/2") RECOVERED 2 in.

- R E F U S A L -

(NO PENETRATION WITH AUGERS)
NO WATER ENCOUNTERED
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 3'0"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-3-2022

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CARR-DEE CORP.

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To: LEAVITT ASSOC., INC., 1514 BEACON ST., BROOKLINE, MA Date: 8-4-2022 Job No.: 20220106

Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 4A

GROUND SURFACE
+16.4

AUGERED (NO SAMPLES TAKEN)

3'1"

- R E F U S A L -

(NO PENETRATION WITH AUGERS)
NO WATER ENCOUNTERED
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 3'0"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-3-2022

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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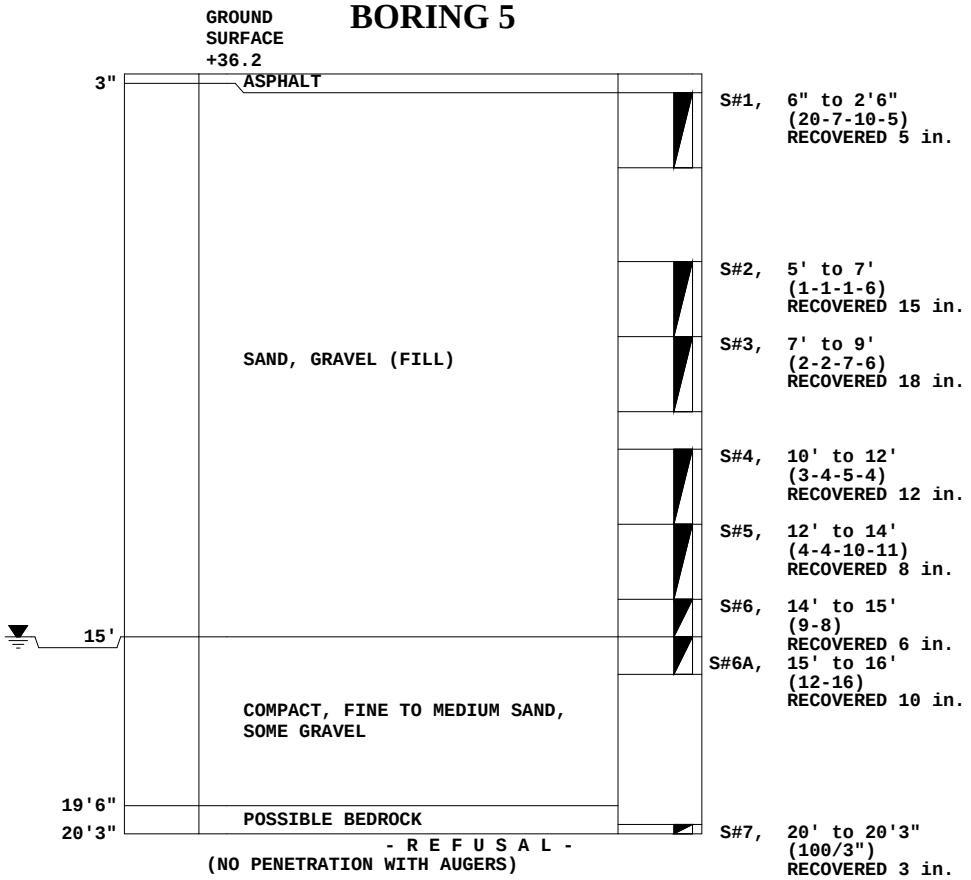
To: LEAVITT ASSOC., INC., 1514 BEACON ST., BROOKLINE, MA Date: 8-4-2022 Job No.: 20220106

Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 5



WATER LEVEL 15'
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 20'3"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-2-2022

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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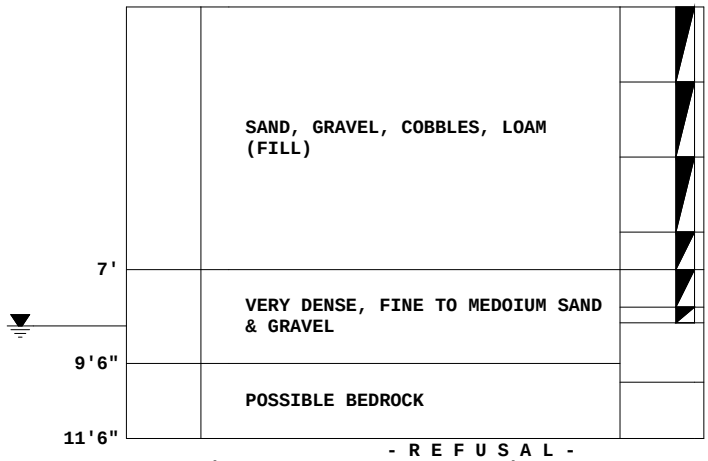
Location: 120 NANATASKET AVENUE, HULL, MA Scale: 1 in.= 5 ft.

BORING 6



S#1, 0' to 2' (5-6-5-4) RECOVERED 12 in.

S#2, 2' to 4' (9-7-6-6) RECOVERED 12 in.

S#3, 4' to 6' (8-5-2-1) RECOVERED 6 in.

S#4, 6' to 7' (2-4) RECOVERED 8 in.

S#4A, 7' to 8' (19-24) RECOVERED 3 in.

S#5, 8' to 8'5" (100/5") RECOVERED 3 in.

S#6, 10' to 10' (100/0") RECOVERED 0 in.

S#7, 11'6" to 11'6" (100/0") RECOVERED 0 in.

WATER LEVEL 8'6"
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 11'6"
DRILLER: G. SMITH, INSPECTOR: T. CORMICAN
DATE STARTED & COMPLETED: 8-3-2022

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).