STORMWATER CALCULATIONS & REPORT

Project

43 Mattakeesett Street,
Pembroke, MA 02359
Assessor's Parcel C9-17
Proposed Storage Building

Owner

Old Salt Realty Trust
387 Main Street
Plympton, MA 02367

Applicant

Jeffrey Perette
387 Main Street
Plympton, MA 02367

Date: February 20, 2020
Revised: April 16, 2020
Revised: September 23, 2020

Prepared by:

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TABLE OF CONTENTS

Project Narrative
43 Mattakeesett Street
Pembroke, Massachusetts

Project Summary

The project proponent proposes to construct a new storage building at 43 Mattakeesett Street, Pembroke, MA. The property is shown as Pembroke Assessor's Parcel C9-17 and is approximately 2.53 acres. The property has frontage on Mattakeesett Street and is abutted by developed residential properties and a cemetery in the rear. The property slopes to the northeast toward the abutting cemetery.

The proposed stormwater system is comprised of deep sumped hooded catch basins, a particle separator, and a new subsurface infiltration system. The systems will provide groundwater recharge and control the rates and volumes of runoff.

The work proposed by this project is described as constructing a new storage building and associated grading, landscaping, and stormwater mitigation. The disturbed areas will be restored and stabilized with the proposed building.

Pre-Development Condition

The site is currently comprised of an office building with an attached garage, barn, paved driveway, concrete walkways, woods, compacted gravel and landscaped areas. The property currently has a stormwater system consisting of four roof drywells and a subsurface infiltration system located in the rear of the property that will be relocated.

Soil information was obtained from the Web Soil Survey (WSS) of the United States Department of Agriculture's Natural Resources Conservation Services and on-site soil testing. Based on WSS Soils Mapping the soils are classified as "439B – Gloucester-Canton complex, 3 to 8 percent slopes" (Hydrologic Soil Group A).

Post-Development Condition

In the post-development condition stormwater analysis, the same watershed areas were analyzed for the purpose of analyzing the rates and volumes of runoff from the proposed new storage building. The proposed stormwater system is comprised deep sump hooded catch basins, a particle separator, and a new subsurface infiltration system capturing runoff from the existing paved areas and the proposed storage building roof. The system will provide groundwater recharge and control the rates and volumes of runoff. Refer to Watershed Delineation Plan for a delineation of post-development drainage subareas. The design points for the post-development design condition correspond to the design points for the pre-development design condition and are shown on the plans.

The stormwater management system was designed to be in compliance with the DEP Stormwater Management Policy to the extent practicable.

SUMMARY OF STORMWATER STANDARDS 1 – 10
(43 Mattakeesett Street, Pembroke, MA)

Standard #1: ***No new stormwater conveyances (i.e. outfalls)…***

The project complies as it does not propose any new stormwater outfalls. Stormwater in the existing and proposed conditions flows overland in a northeasterly direction towards the abutting cemetery. It is the intent of the proposed design to follow the natural/existing conditions stormwater flow paths to the extent practicable. Proposed roof runoff and runoff from existing paved areas will be directed to a subsurface infiltration system.

Standard #2: ***Post-Development peak discharge rates do not exceed pre-development rates…***

The project has been designed to mitigate peak rates and volumes of runoff. See below for calculations of the runoff discharges and volumes for the 2, 10 and 100-yr. storm events.

Peak Discharge Rates (cfs):

Design Point #1:

	2-Yr.	10-Yr.	100-Yr.
Pre-Development	1.08	3.70	11.05
Post-Development	0.64	3.51	11.04

Volume of Runoff (ac-ft.):

Design Point #1:

	2-Yr.	10-Yr.	100-Yr.
Pre-Development	0.107	0.296	0.880
Post-Development	0.074	0.278	0.876

Standard #3: ***Loss of annual recharge to groundwater shall be eliminated…***

There is no loss of annual recharge to groundwater because the project proposes a system of roof drywell chambers designed to infiltrate runoff.

Recharge Volume = 0.6 inches of runoff X Increased Impervious Area** (Hydrologic Soil Group A)

The redevelopment results in 17,294 s.f. of impervious roof.

Therefore Minimum Recharge Volume = 0.6 in. x 17,294 s .f. X (1 ft./12 in.) = 864 c.f. (min.)

PROVIDED RECHARGE = 4,362 c.f.
Provided within the subsurface infiltration system.
The new subsurface infiltration system provides 4,362 c.f. greater storage than the existing. – see HydroCAD results in Appendix C)

Standard #4: ***Stormwater management systems…shall remove 80% of the average… TSS….***

Requirement: Provide 80% TSS Removal of the Water Quality Volume.

The treatment stream for the existing paved area (Sub-2) (a portion of which will be saw cut and repaved) is treated via existing deep sump hooded catch basins and a 2,500 gallon particle separator prior to a subsurface infiltration system which will be replaced. TSS removal calculations are included in Appendix

**Total impervious area for Std. 4 Calculation is not required to include roof runoff, as roof runoff is considered clean and free of suspended solids (non-metal roof is proposed).*

Standard #5: Stormwater discharges from Land Uses with Higher Potential Pollutant Loads

Not applicable. An office building is not a land use with higher potential pollutant loads.

Standard #6: Stormwater discharges to critical areas…

Not applicable. The property is not an ACEC.

Standard #7: A redevelopment project is required to meet standards….only to the extent practicable

The project is considered to be a partial redevelopment. The project has been designed to comply with all standards.

Standard #8: Erosion & Sedimental Control Plan

An Erosion & Sedimentation Control plan is submitted in Appendix A of this report.

Standard #9: A Long Term Operation & Maintenance Plan shall be developed…

A Post-Construction Operation & Maintenance Plan is submitted in Appendix A of this report.

Standard #10: All illicit discharges to the stormwater management system are prohibited.

An illicit discharge compliance statement is submitted in Appendix A of this report.

INSTRUCTIONS:
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.

Version 1, Automated: Mar. 4, 2008

Location: 43 Mattakeesett Street

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)
Subsurface Infiltration Structure	**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: 19-143
Prepared By: JMH
Date: 4/16/2020

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

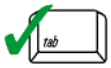
Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

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.

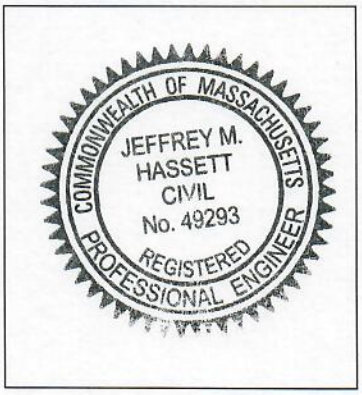
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



4-16-2020

Signature and Date

Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX A

- Const. Phase Stormwater Management Plan
- Construction Phase Erosion Control Maintenance Schedule & Checklist
- Post-Development Operation & Maintenance Plan & Long-Term Operation & Maintenance
- Illicit Discharge Compliance Statement

Construction Phase Operation & Maintenance Plan
Best Management Practices
43 Mattakeesett Street
Pembroke, MA

Responsible Parties & Contact Information:

Owner:

Old Salt Realty Trust
387 Main Street
Plympton, MA 02367
781-635-0242

Contractor:

Inspection & Record Keeping:

The responsible party shall maintain an operation and maintenance log during construction to control construction-related impacts, including erosion, sedimentation and other pollutant sources and land disturbance activities.

The anticipated time to complete this project is twelve months. The responsible party shall inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½ inch or greater. Inspections shall be performed until the site is fully stabilized and the temporary sedimentation controls have been removed. The inspector shall inspect each measure to determine if it was installed/performed correctly. The inspector shall also determine if the measures have been damaged and if so the corrective action.

The log shall kept on-site at all times and shall be made available to the Planning Board upon request. Member and agents of the Town shall be allowed to enter and inspect the premises to evaluate and ensure that the responsible party complies with the Operation and Maintenance Plan requirements for each BMP.

Operation & Maintenance:

Land disturbance activities for this project include constructing the proposed storage building and associated grading, landscaping, and stormwater systems. During land disturbance and construction activities, project proponents must implement controls that prevent erosion, control sediment movement, and stabilize exposed soils to prevent pollutants from moving offsite. Construction activities increase the potential for erosion and sedimentation at a site. To prevent this impact, the following conditions shall be imposed to control erosion and sedimentation:

Stabilization Practices: Disturbed areas shall be stabilized and protected as soon as practicable. Disturbed areas shall be stabilized when construction activity in the area has ceased for more than 14 days unless not feasible due to snow cover or if construction activities will resume within 21 days after construction temporarily ceased. Stabilization measures include the following:

- Temporary seeding
- Geotextiles
- Mulching and Netting
- Permanent seeding

Construction Phase: Erosion Control Maintenance Schedule & Checklist

Construction Practices

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check (1)	Cleaning/Repair Needed: ☐yes ☐no (List Items)	Date of Cleaning/ Repair	Performed by
Construction Site Stabilization	Weekly			1. Construction Site Stabilization Inspection/ Maintenance, temporary seeding, mulching etc. Disturbed areas shall be stabilized when construction activity in the area has ceased for more than 14 days			
Erosion Barrier	Bi-Weekly			1 Remove accumulated silt. 2 Repair rips / bulges.			
Mulching & Netting	Bi-Weekly			1. Mulch Maintenance			
Land Grading	Weekly			1. Check for washouts and/or gullies. 2. Check for accumulated silt.			
Permanent Seeding	Bi-Weekly			1. Permanent Seeding Inspection/ Maintenance			

Stormwater Control Manager _____

Long-Term Operation & Maintenance Plan
Best Management Practices
53 Mattakeesett Street
Pembroke, MA

Responsible Parties & Contact Information:

Owner:

Old Salt Realty Trust
387 Main Street
Plympton, MA 02367
781-635-0242

Record Keeping:

The responsible party shall maintain an operation and maintenance log for a minimum of three years prior including inspections, repairs, replacement and disposal. The log shall be kept on-site at all times.

The log shall be made available to the Planning Board upon request. Members and agents of the Town shall be allowed to enter and inspect the premises to evaluate and ensure that the responsible party complies with the Operation and Maintenance Plan requirements for each BMP.

Operation & Maintenance:

In order to maintain the integrity of the stormwater management system, frequent inspections and maintenance shall be performed by the owner. The BMPs require continuous inspections and maintenance in order to function properly. The BMPs should be inspected and maintained as specified and after all major storm events.

Gutter & Downspout Systems shall be inspected quarterly. Material observed within any gutter or downspout shall be removed and disposed of in accordance with all applicable local, state and federal regulations. Inspect for signs of overflow to the surcharge pipe. It is recommended that "gutter guards" be installed on the roof gutter system to prevent leaves and tree debris from entering the subsurface system.

Roof Drywells shall be checked for infiltrative capacity on a quarterly basis and after any significant rainfall event. Additional inspections should be scheduled during the first few months to make sure that the chambers are exfiltrating within 72 hours of all storms. It is recommended that "gutter guards" be installed on the roof gutter system to prevent leaves and tree debris from entering the subsurface system. Material observed within any roof drywell shall be removed and disposed of in accordance with all applicable local, states and federal regulations.

Anticipated Operation and Maintenance Cost:
The annual anticipated operation and maintenance cost is approximately $1,000.00.

Project Location: 43 Mattakeesett Street, Pembroke, MA

Stormwater Management – Post Construction Phase

Best Management Practices – Inspection Schedule and Evaluation Checklist

Long Term Practices

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check (1)	Cleaning/Repair Needed: ☐yes ☐no (List Items)	Date of Cleaning/ Repair	Performed by
Driveway Sweeping	Monthly			Sweep & Remove any accumulated sediment			
Gutter and Downspout System	Quarterly			Remove material in gutters and downspouts. Install gutter guards. Inspect for signs of overflow to surcharge.			
Roof Drywell System	Quarterly			Inspect for infiltrative capacity Repair erosion or scour			

April 16, 2020

TO: Town of Pembroke
Planning Board
100 Center Street, Town Hall
Pembroke, MA 02359

RE: 43 Mattakeesett Street, Pembroke, MA

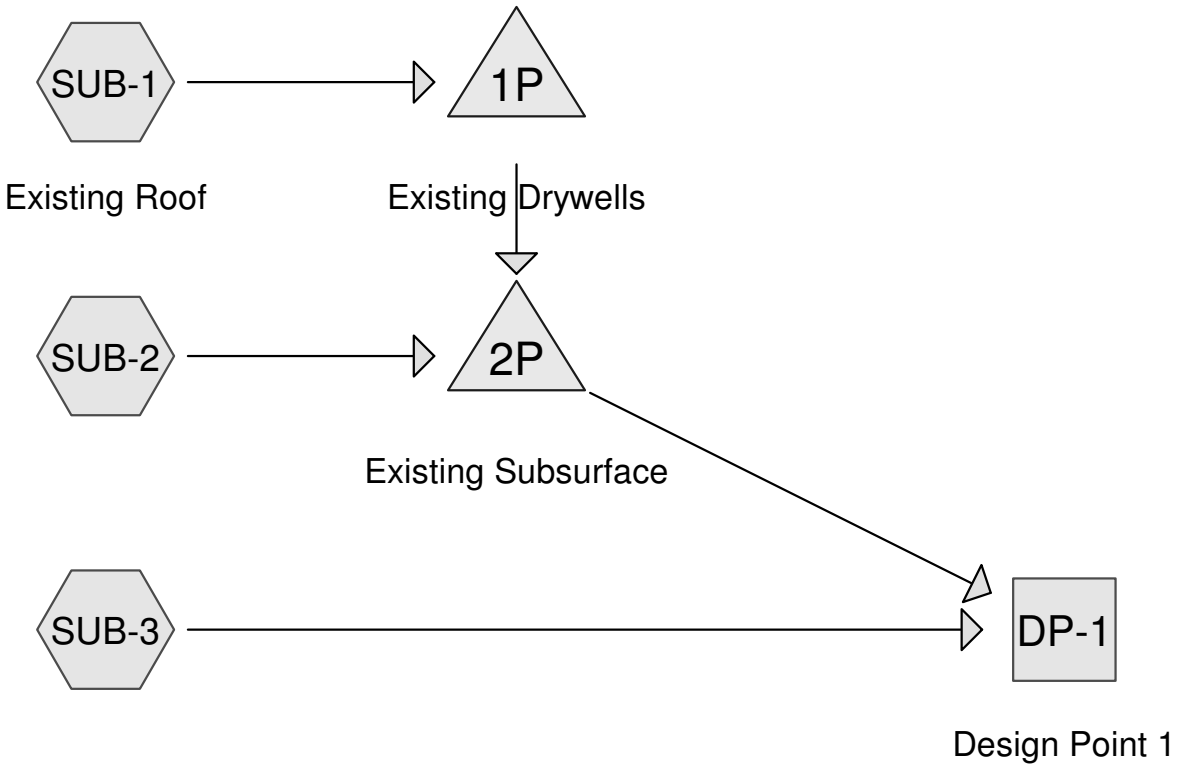
To Members of the Board:

This letter is a statement that to the best of my knowledge, no illicit discharges currently exist or are being considered by me to the stormwater management system. An illicit discharge is any discharge that is not composed entirely of stormwater.

Applicant's Representative

APPENDIX B

- Pre-Development HydroCAD Analysis
- Post-Development HydroCAD Analysis



Subcat Reach Pond Link

Drainage Diagram for PRECONST

Prepared by Morse Engineering Company, Inc., Printed 4/27/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.343	30	Woods, Good, HSG A (SUB-3)
0.403	39	>75% Grass cover, Good, HSG A (SUB-2)
0.679	76	Gravel, HSG A (SUB-3)
0.660	98	Pavement (SUB-2, SUB-3)
0.150	98	Roof (SUB-1, SUB-2, SUB-3)
2.235		**TOTAL AREA**

Summary for Subcatchment SUB-1: Existing Roof

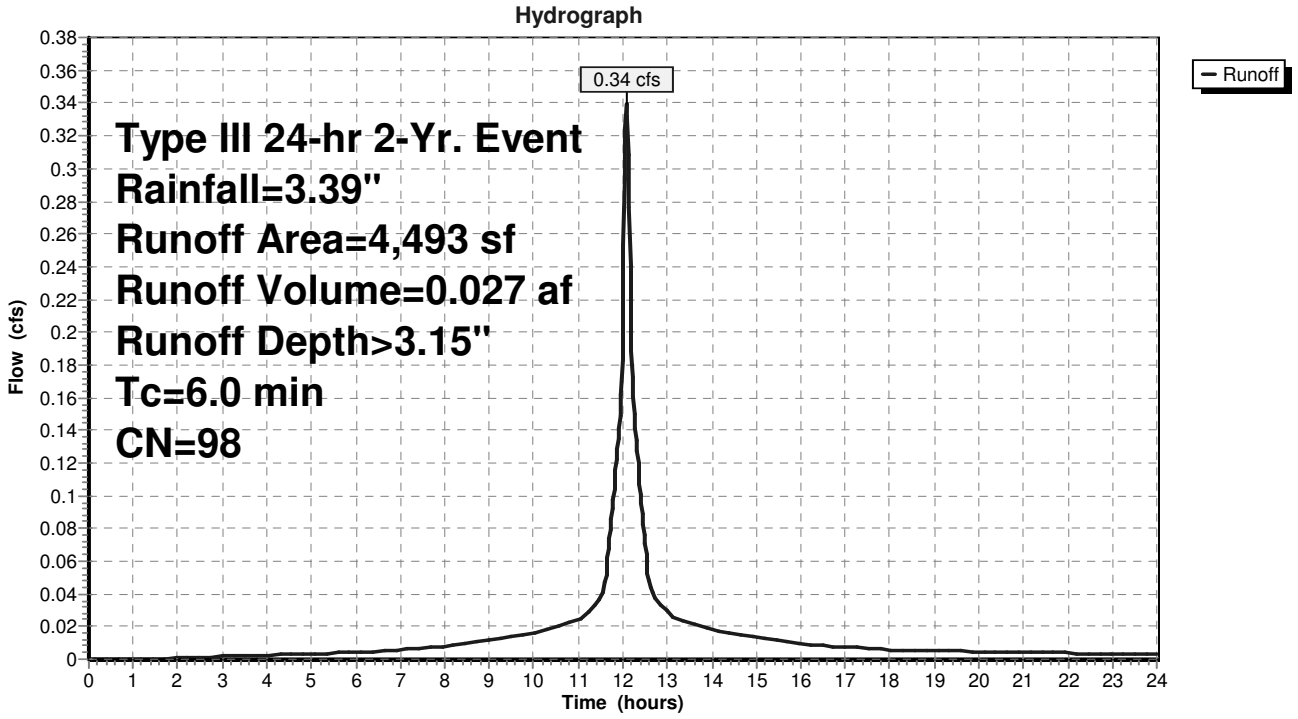
Runoff = 0.34 cfs @ 12.08 hrs, Volume= 0.027 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr. Event Rainfall=3.39"

	Area (sf)	CN	Description
*	4,493	98	Roof
	4,493		100.00% Impervious Area

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

Subcatchment SUB-1: Existing Roof



Summary for Subcatchment SUB-2:

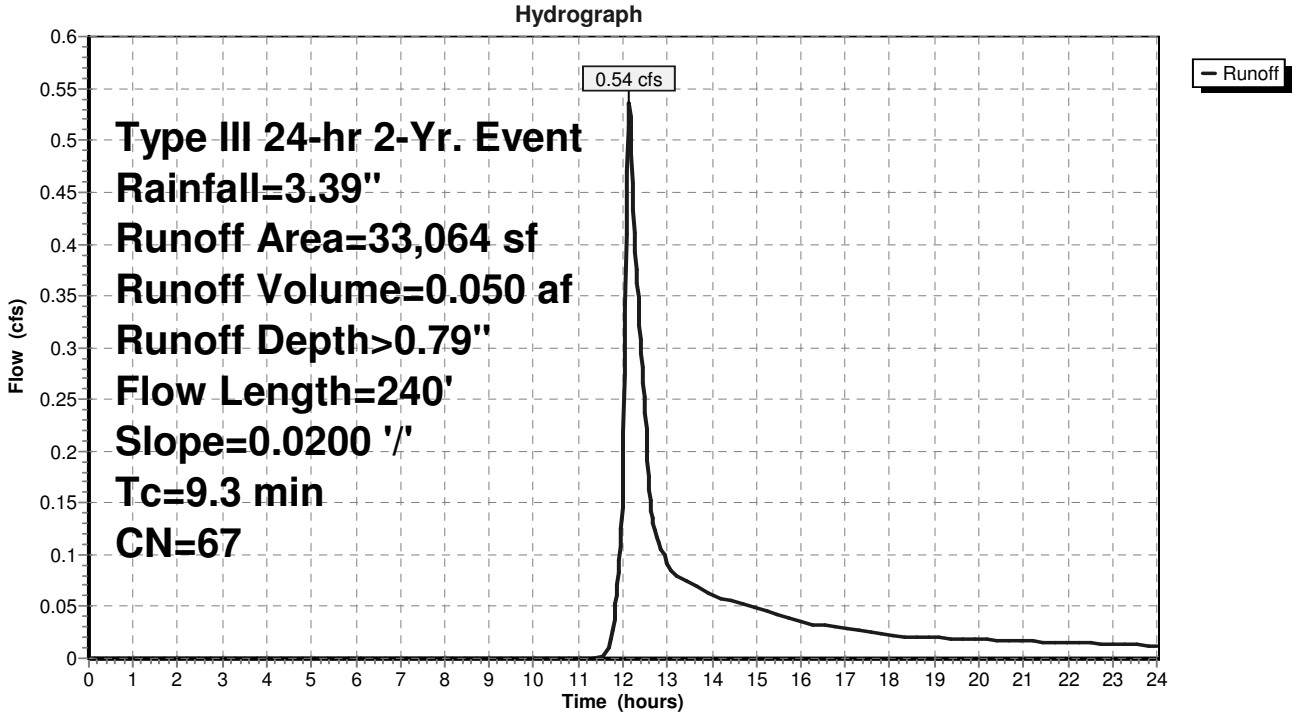
Runoff = 0.54 cfs @ 12.15 hrs, Volume= 0.050 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr. Event Rainfall=3.39"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	14,506	98	Pavement
	17,545	39	>75% Grass cover, Good, HSG A
	33,064	67	Weighted Average
	17,545		53.06% Pervious Area
	15,519		46.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	190	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	240	Total			

Subcatchment SUB-2:



Summary for Subcatchment SUB-3:

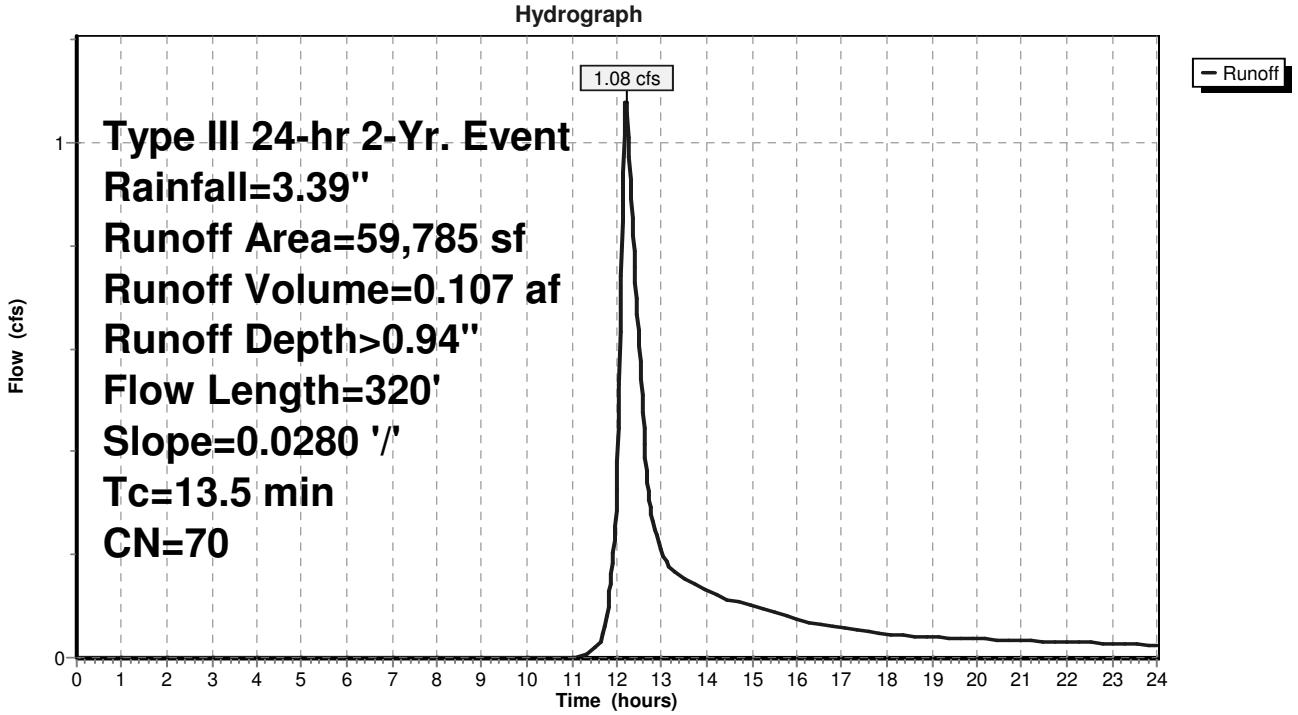
Runoff = 1.08 cfs @ 12.20 hrs, Volume= 0.107 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr. Event Rainfall=3.39"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	14,232	98	Pavement
*	29,589	76	Gravel, HSG A
	14,951	30	Woods, Good, HSG A
	59,785	70	Weighted Average
	44,540		74.50% Pervious Area
	15,245		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.7	270	0.0280	1.67		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
13.5	320	Total			

Subcatchment SUB-3:

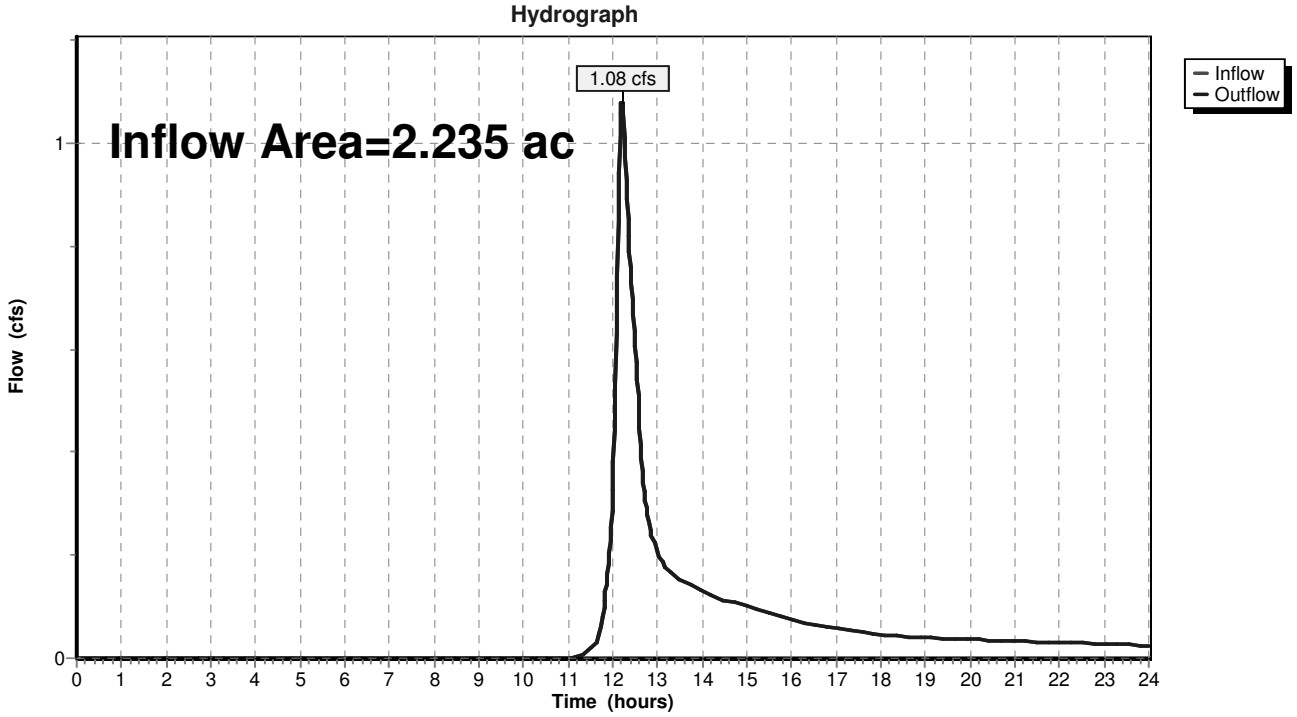


Summary for Reach DP-1: Design Point 1

Inflow Area = 2.235 ac, 36.22% Impervious, Inflow Depth > 0.58" for 2-Yr. Event event
Inflow = 1.08 cfs @ 12.20 hrs, Volume= 0.107 af
Outflow = 1.08 cfs @ 12.20 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Reach DP-1: Design Point 1



Summary for Pond 1P: Existing Drywells

Inflow Area = 0.103 ac,100.00% Impervious, Inflow Depth > 3.15" for 2-Yr. Event event
Inflow = 0.34 cfs @ 12.08 hrs, Volume= 0.027 af
Outflow = 0.03 cfs @ 12.84 hrs, Volume= 0.027 af, Atten= 90%, Lag= 45.4 min
Discarded = 0.03 cfs @ 12.84 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 99.79' @ 12.84 hrs Surf.Area= 285 sf Storage= 457 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 117.4 min (872.1 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	96.70'	355 cf	**Custom Stage Data (Conic)** Listed below (Recalc) x 3 1,140 cf Overall - 252 cf Embedded = 888 cf x 40.0% Voids
#2	97.70'	252 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 3 Inside #1
		607 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
96.70	95	0	0	95
97.70	95	95	95	130
98.70	95	95	190	164
99.70	95	95	285	199
100.70	95	95	380	233

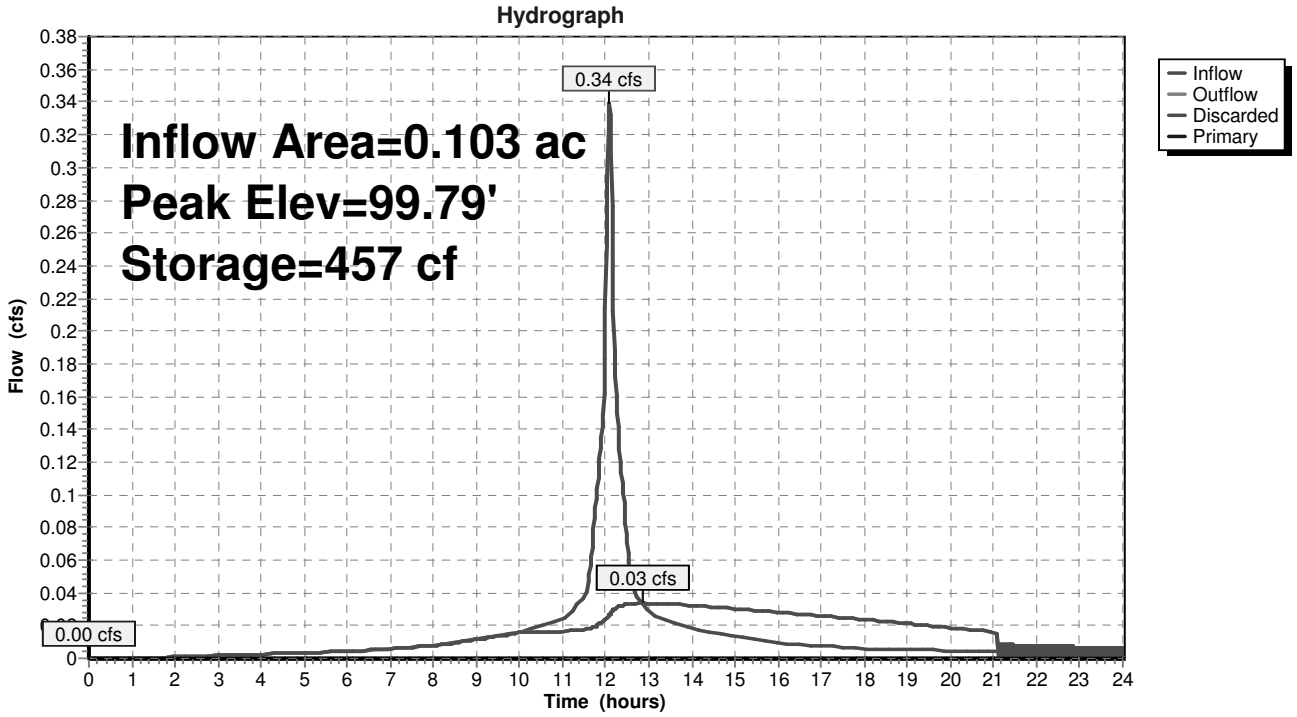
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.70	28	0	0
98.70	28	28	28
99.70	28	28	56
100.70	28	28	84

Device	Routing	Invert	Outlet Devices
#1	Discarded	96.70'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	100.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 12.84 hrs HW=99.79' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=96.70' TW=88.33' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Existing Drywells



Summary for Pond 2P: Existing Subsurface

Inflow Area = 0.862 ac, 53.28% Impervious, Inflow Depth > 0.69" for 2-Yr. Event event
Inflow = 0.54 cfs @ 12.15 hrs, Volume= 0.050 af
Outflow = 0.04 cfs @ 15.74 hrs, Volume= 0.037 af, Atten= 93%, Lag= 215.5 min
Discarded = 0.04 cfs @ 15.74 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 91.35' @ 15.74 hrs Surf.Area= 468 sf Storage= 1,033 cf

Plug-Flow detention time= 281.6 min calculated for 0.037 af (75% of inflow)
Center-of-Mass det. time= 186.2 min (1,069.9 - 883.7)

Volume	Invert	Avail.Storage	Storage Description
#1	88.33'	322 cf	**Stone (Conic)** Listed below (Recalc) 2,340 cf Overall - 1,536 cf Embedded = 804 cf x 40.0% Voids
#2	89.33'	1,536 cf	**24 4x4x4 galleys (Prismatic)** Listed below (Recalc) Inside #1
		1,858 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.33	468	0	0	468
89.33	468	468	468	545
90.33	468	468	936	621
91.33	468	468	1,404	698
92.33	468	468	1,872	775
93.33	468	468	2,340	851

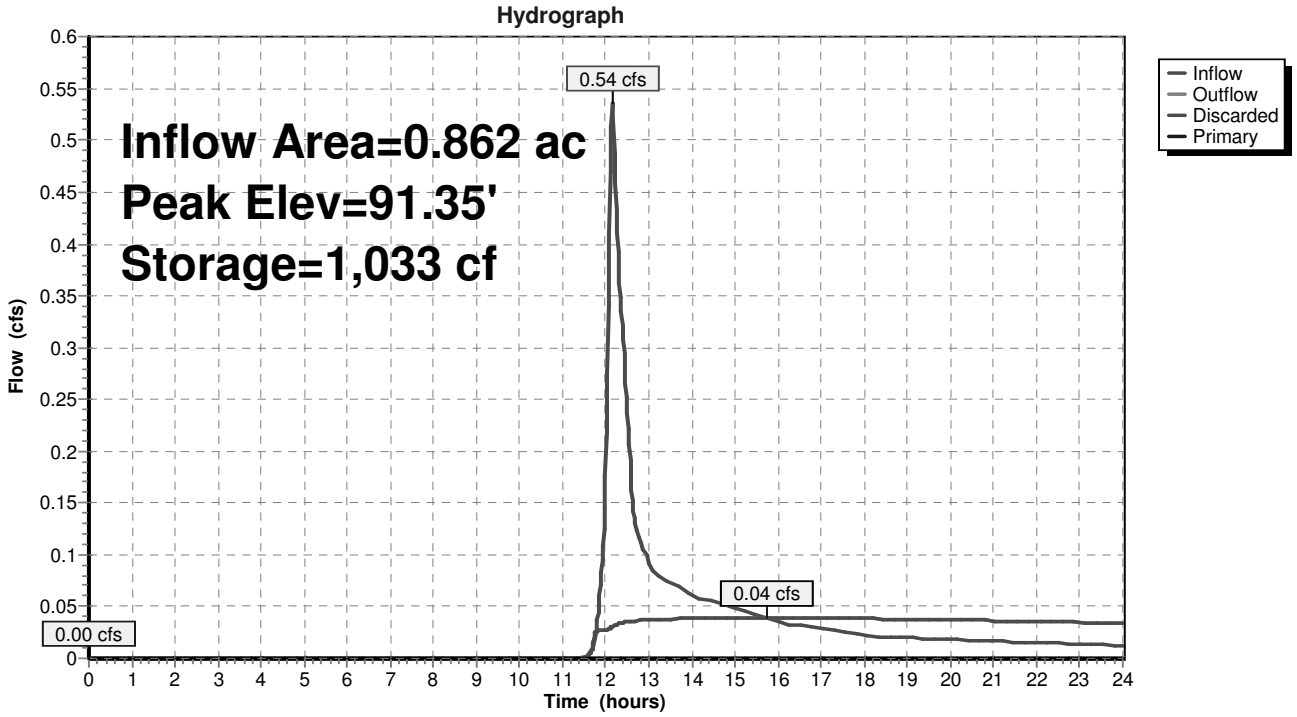
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
89.33	384	0	0
90.33	384	384	384
91.33	384	384	768
92.33	384	384	1,152
93.33	384	384	1,536

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.33'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	91.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 15.74 hrs HW=91.35' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.33' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 2P: Existing Subsurface



Summary for Subcatchment SUB-1: Existing Roof

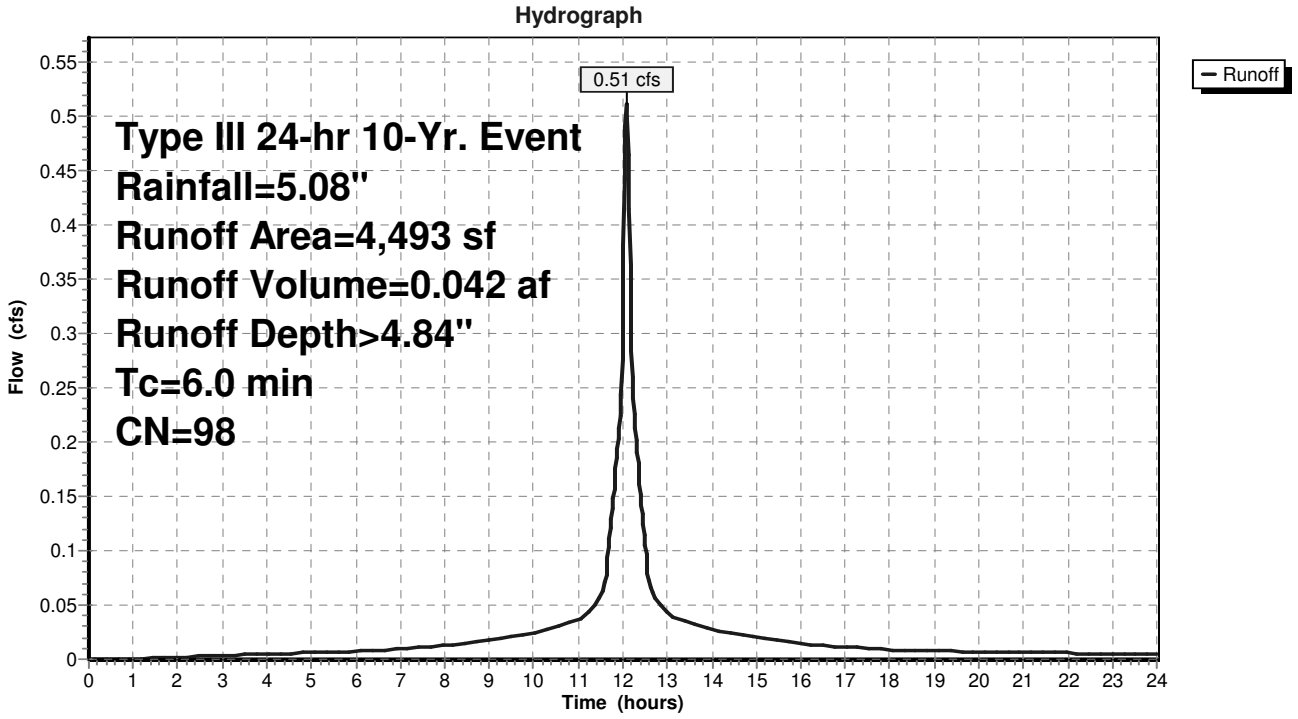
Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.042 af, Depth> 4.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr. Event Rainfall=5.08"

	Area (sf)	CN	Description
*	4,493	98	Roof
	4,493		100.00% Impervious Area

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

Subcatchment SUB-1: Existing Roof



Summary for Subcatchment SUB-2:

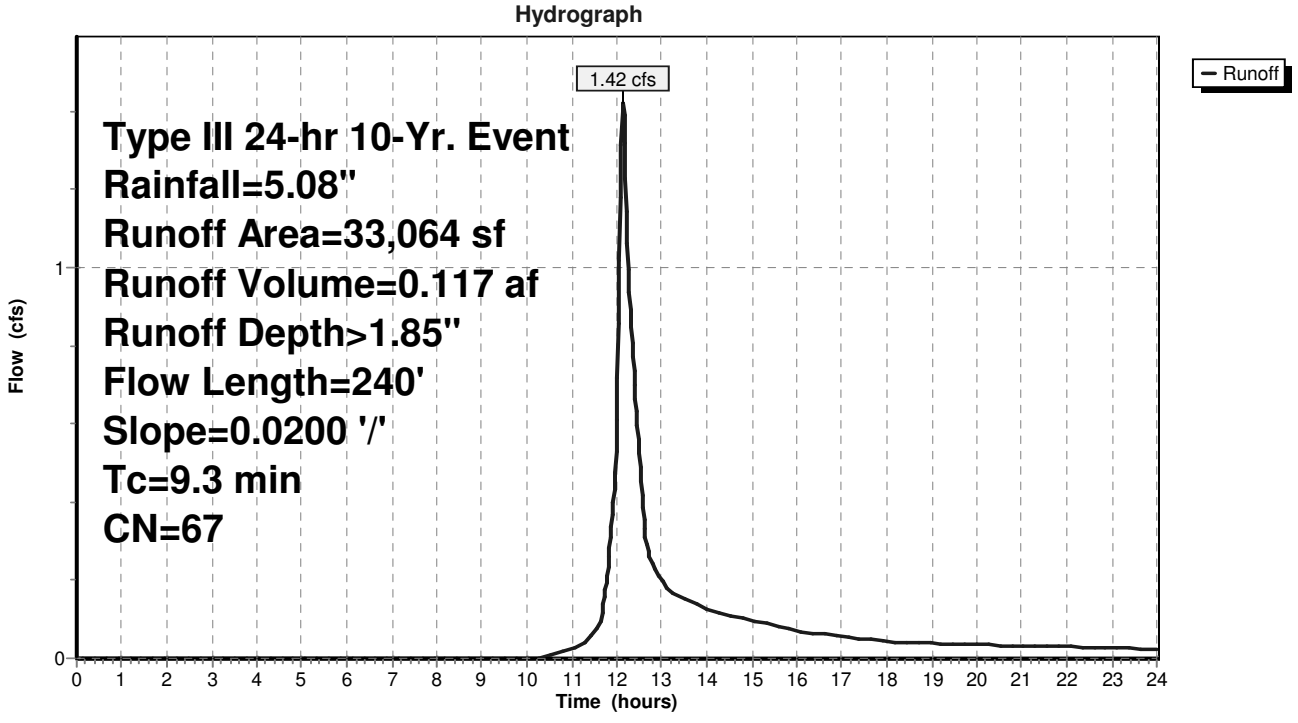
Runoff = 1.42 cfs @ 12.14 hrs, Volume= 0.117 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr. Event Rainfall=5.08"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	14,506	98	Pavement
	17,545	39	>75% Grass cover, Good, HSG A
	33,064	67	Weighted Average
	17,545		53.06% Pervious Area
	15,519		46.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	190	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	240	Total			

Subcatchment SUB-2:



Summary for Subcatchment SUB-3:

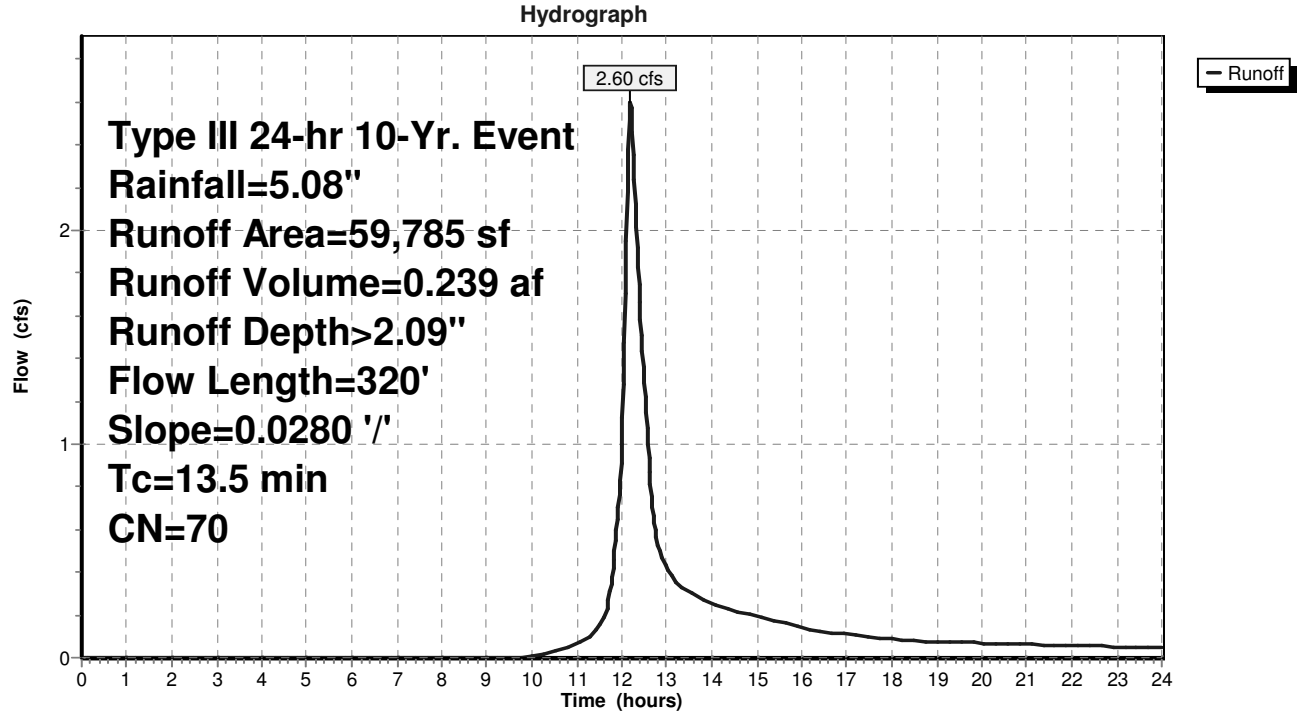
Runoff = 2.60 cfs @ 12.19 hrs, Volume= 0.239 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr. Event Rainfall=5.08"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	14,232	98	Pavement
*	29,589	76	Gravel, HSG A
	14,951	30	Woods, Good, HSG A
	59,785	70	Weighted Average
	44,540		74.50% Pervious Area
	15,245		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.7	270	0.0280	1.67		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
13.5	320	Total			

Subcatchment SUB-3:

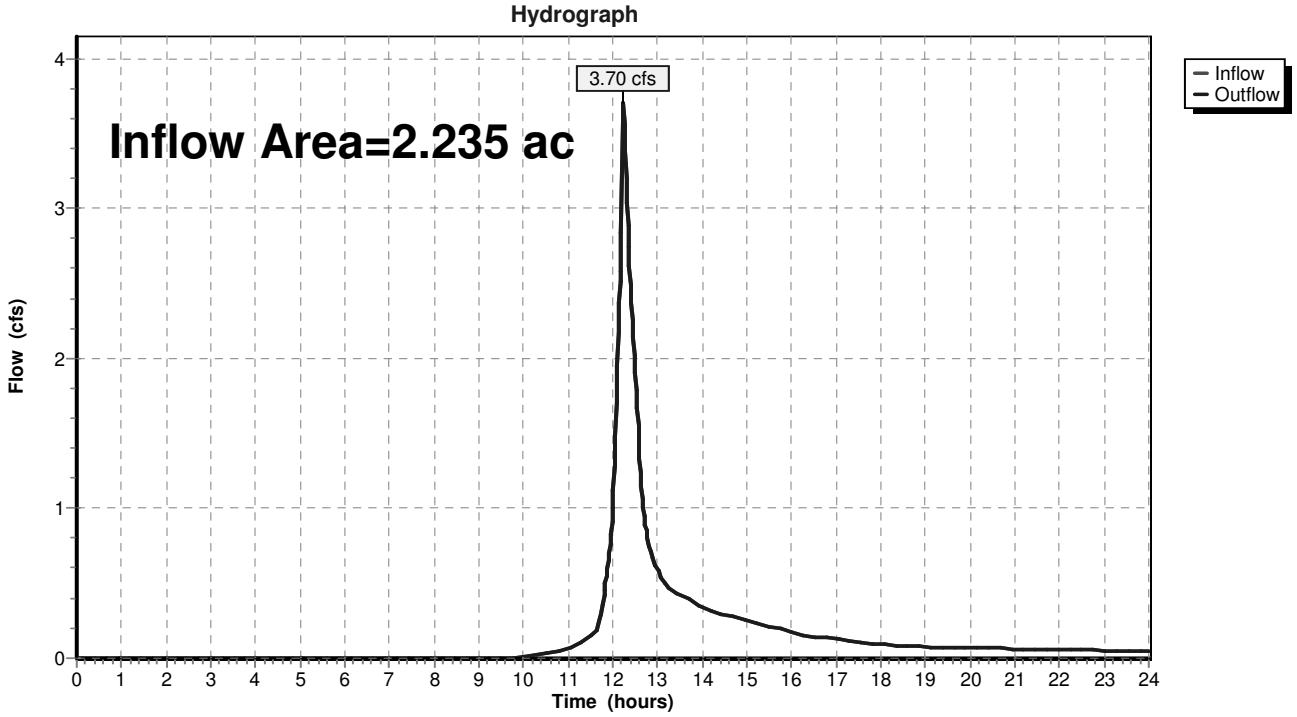


Summary for Reach DP-1: Design Point 1

Inflow Area = 2.235 ac, 36.22% Impervious, Inflow Depth > 1.59" for 10-Yr. Event event
Inflow = 3.70 cfs @ 12.24 hrs, Volume= 0.296 af
Outflow = 3.70 cfs @ 12.24 hrs, Volume= 0.296 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Reach DP-1: Design Point 1



Summary for Pond 1P: Existing Drywells

Inflow Area = 0.103 ac,100.00% Impervious, Inflow Depth > 4.84" for 10-Yr. Event event
Inflow = 0.51 cfs @ 12.08 hrs, Volume= 0.042 af
Outflow = 0.35 cfs @ 12.17 hrs, Volume= 0.042 af, Atten= 31%, Lag= 5.2 min
Discarded = 0.04 cfs @ 12.17 hrs, Volume= 0.034 af
Primary = 0.32 cfs @ 12.17 hrs, Volume= 0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 100.23' @ 12.17 hrs Surf.Area= 285 sf Storage= 530 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 109.7 min (856.9 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1	96.70'	355 cf	**Custom Stage Data (Conic)** Listed below (Recalc) x 3 1,140 cf Overall - 252 cf Embedded = 888 cf x 40.0% Voids
#2	97.70'	252 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 3 Inside #1
		607 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
96.70	95	0	0	95
97.70	95	95	95	130
98.70	95	95	190	164
99.70	95	95	285	199
100.70	95	95	380	233

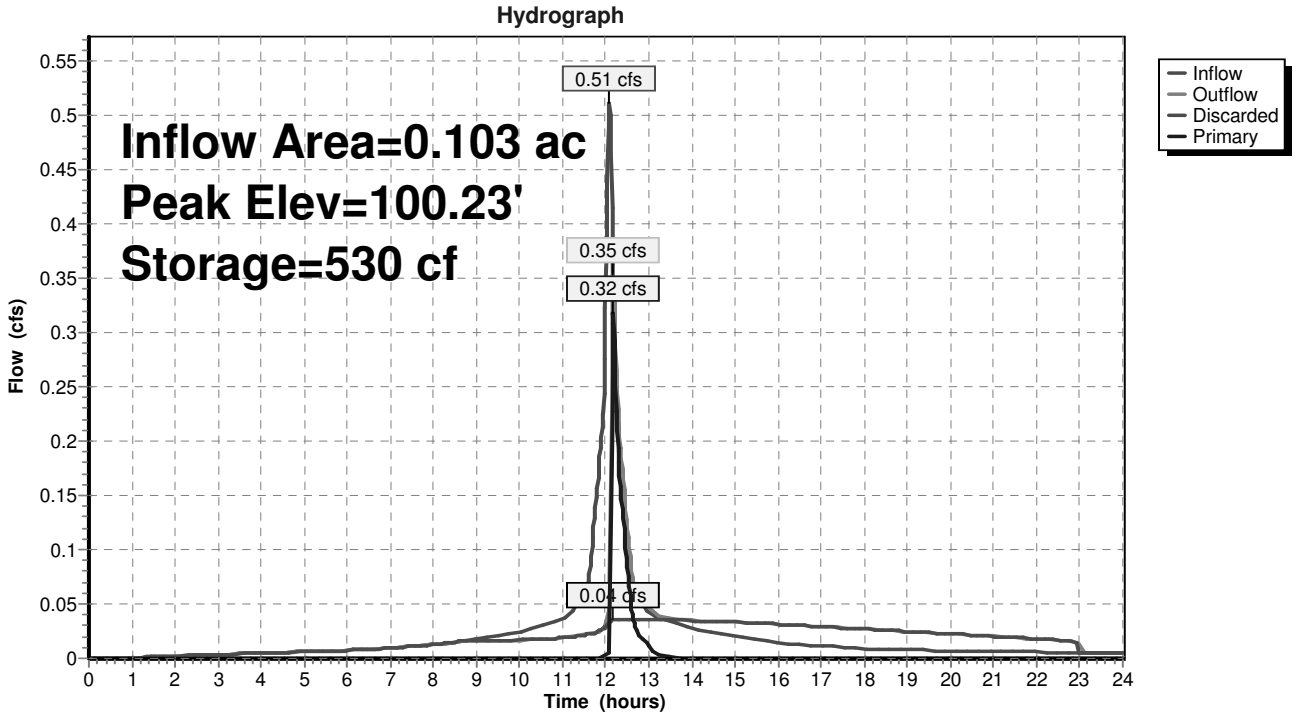
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.70	28	0	0
98.70	28	28	28
99.70	28	28	56
100.70	28	28	84

Device	Routing	Invert	Outlet Devices
#1	Discarded	96.70'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	100.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 12.17 hrs HW=100.23' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.31 cfs @ 12.17 hrs HW=100.23' TW=91.49' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 0.31 cfs @ 1.62 fps)

Pond 1P: Existing Drywells



Summary for Pond 2P: Existing Subsurface

Inflow Area = 0.862 ac, 53.28% Impervious, Inflow Depth > 1.73" for 10-Yr. Event event
Inflow = 1.70 cfs @ 12.16 hrs, Volume= 0.124 af
Outflow = 1.30 cfs @ 12.25 hrs, Volume= 0.100 af, Atten= 23%, Lag= 5.4 min
Discarded = 0.04 cfs @ 12.25 hrs, Volume= 0.043 af
Primary = 1.26 cfs @ 12.25 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 92.05' @ 12.25 hrs Surf.Area= 468 sf Storage= 1,322 cf

Plug-Flow detention time= 132.6 min calculated for 0.100 af (81% of inflow)
Center-of-Mass det. time= 55.7 min (905.4 - 849.8)

Volume	Invert	Avail.Storage	Storage Description
#1	88.33'	322 cf	**Stone (Conic)** Listed below (Recalc) 2,340 cf Overall - 1,536 cf Embedded = 804 cf x 40.0% Voids
#2	89.33'	1,536 cf	**24 4x4x4 galleys (Prismatic)** Listed below (Recalc) Inside #1
		1,858 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.33	468	0	0	468
89.33	468	468	468	545
90.33	468	468	936	621
91.33	468	468	1,404	698
92.33	468	468	1,872	775
93.33	468	468	2,340	851

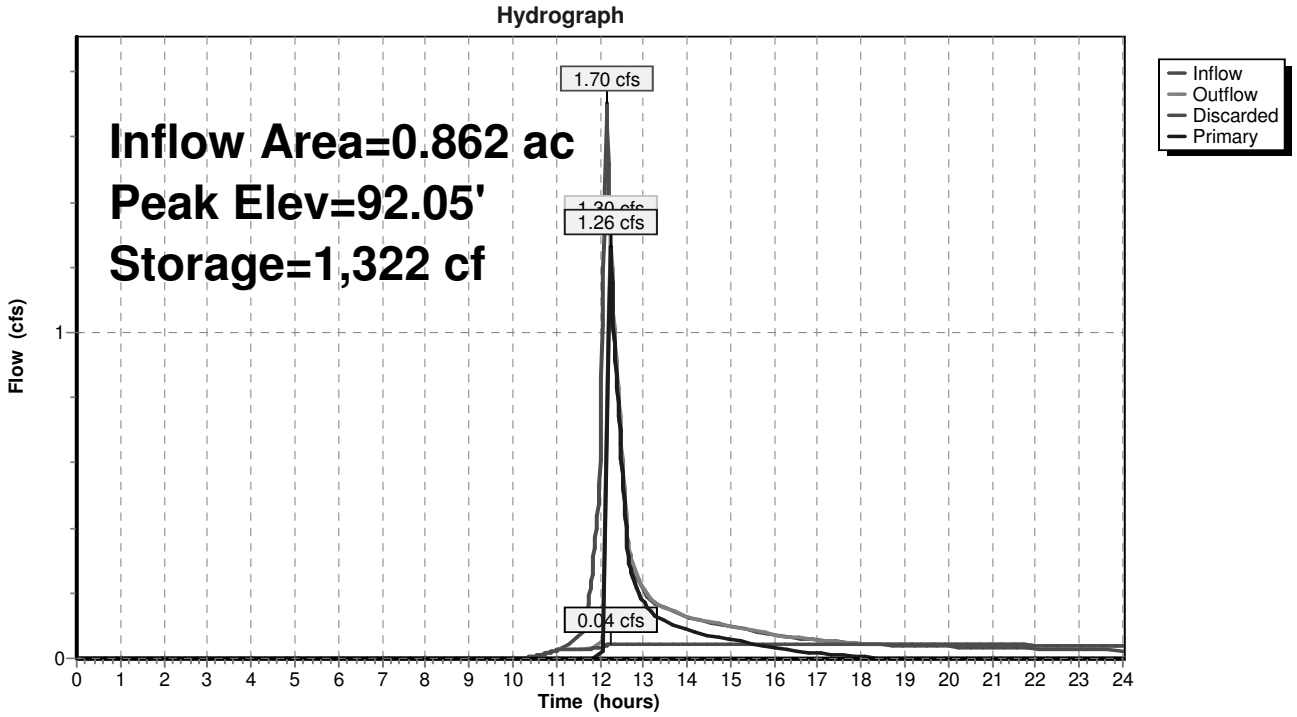
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
89.33	384	0	0
90.33	384	384	384
91.33	384	384	768
92.33	384	384	1,152
93.33	384	384	1,536

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.33'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	91.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.25 hrs HW=92.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.23 cfs @ 12.25 hrs HW=92.04' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 1.23 cfs @ 1.61 fps)

Pond 2P: Existing Subsurface



Summary for Subcatchment SUB-1: Existing Roof

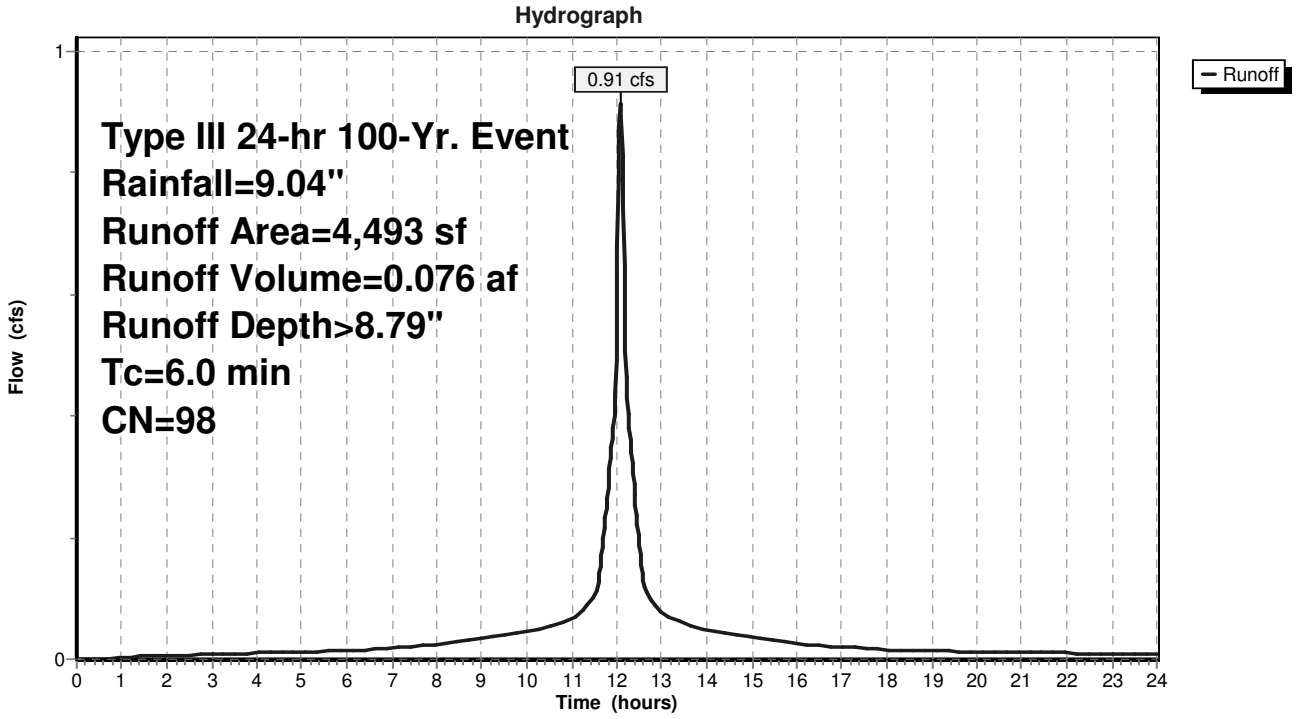
Runoff = 0.91 cfs @ 12.08 hrs, Volume= 0.076 af, Depth> 8.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr. Event Rainfall=9.04"

	Area (sf)	CN	Description
*	4,493	98	Roof
	4,493		100.00% Impervious Area

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

Subcatchment SUB-1: Existing Roof



Summary for Subcatchment SUB-2:

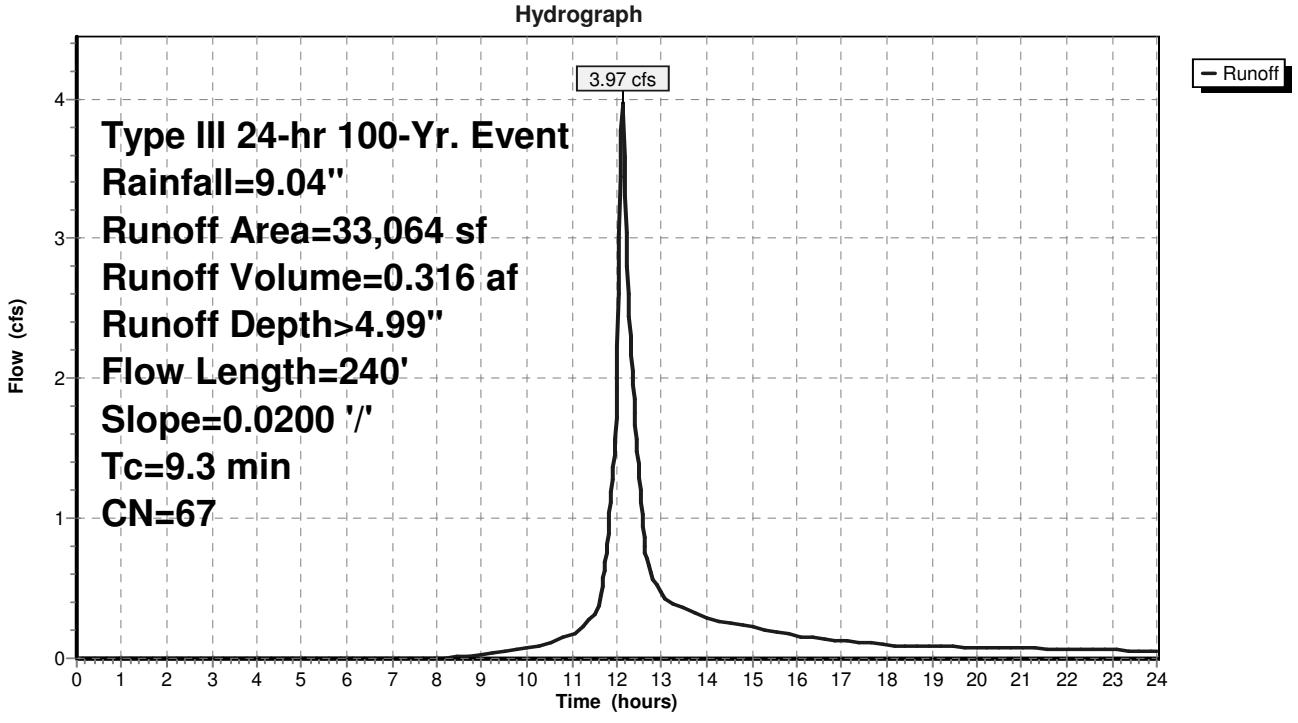
Runoff = 3.97 cfs @ 12.13 hrs, Volume= 0.316 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr. Event Rainfall=9.04"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	14,506	98	Pavement
	17,545	39	>75% Grass cover, Good, HSG A
	33,064	67	Weighted Average
	17,545		53.06% Pervious Area
	15,519		46.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	190	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	240	Total			

Subcatchment SUB-2:



Summary for Subcatchment SUB-3:

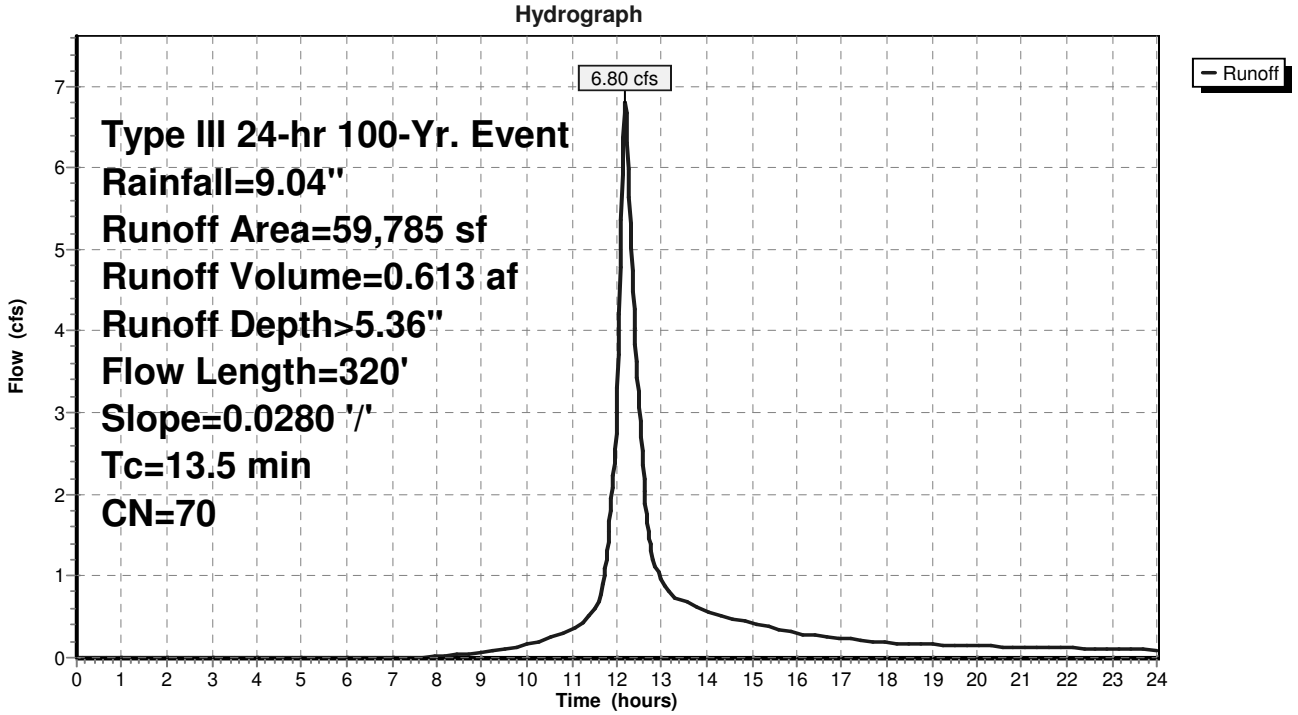
Runoff = 6.80 cfs @ 12.19 hrs, Volume= 0.613 af, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr. Event Rainfall=9.04"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	14,232	98	Pavement
*	29,589	76	Gravel, HSG A
	14,951	30	Woods, Good, HSG A
	59,785	70	Weighted Average
	44,540		74.50% Pervious Area
	15,245		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.7	270	0.0280	1.67		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
13.5	320	Total			

Subcatchment SUB-3:

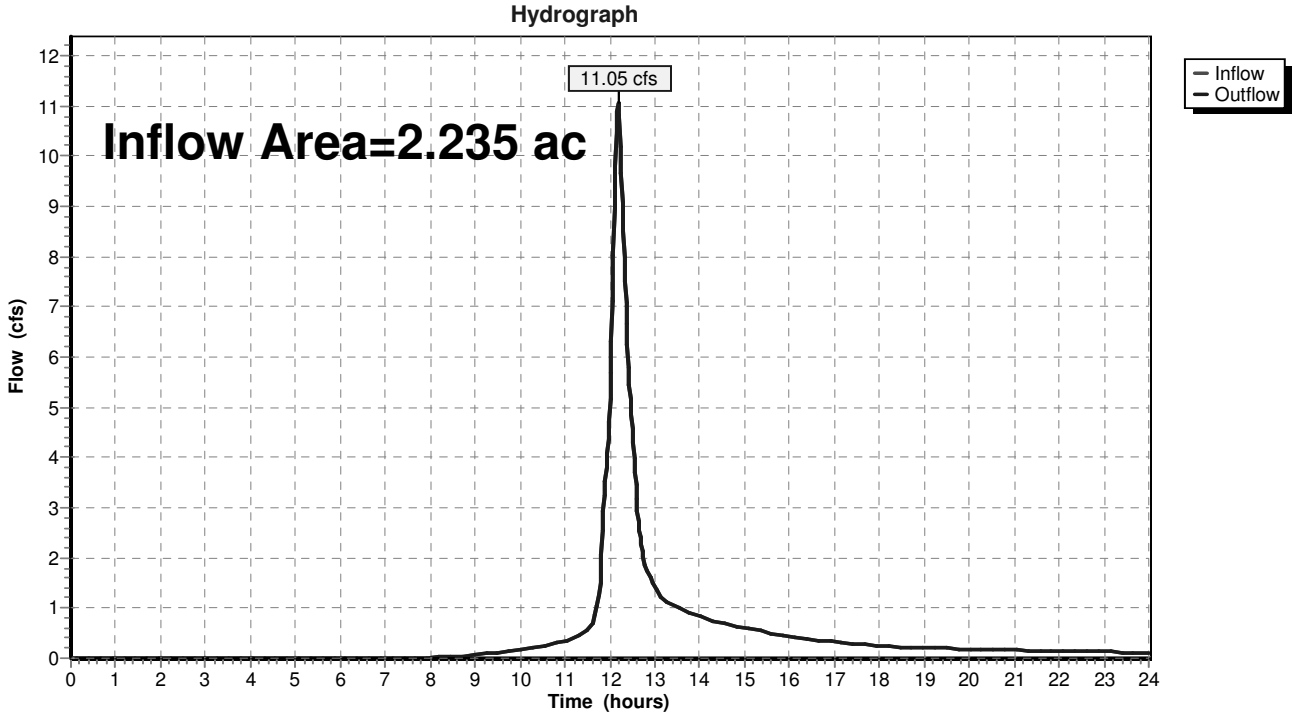


Summary for Reach DP-1: Design Point 1

Inflow Area = 2.235 ac, 36.22% Impervious, Inflow Depth > 4.73" for 100-Yr. Event event
Inflow = 11.05 cfs @ 12.18 hrs, Volume= 0.880 af
Outflow = 11.05 cfs @ 12.18 hrs, Volume= 0.880 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Reach DP-1: Design Point 1



Summary for Pond 1P: Existing Drywells

Inflow Area = 0.103 ac,100.00% Impervious, Inflow Depth > 8.79" for 100-Yr. Event event
Inflow = 0.91 cfs @ 12.08 hrs, Volume= 0.076 af
Outflow = 0.84 cfs @ 12.12 hrs, Volume= 0.074 af, Atten= 8%, Lag= 2.0 min
Discarded = 0.04 cfs @ 12.12 hrs, Volume= 0.044 af
Primary = 0.81 cfs @ 12.12 hrs, Volume= 0.030 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 100.58' @ 12.12 hrs Surf.Area= 285 sf Storage= 587 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 74.4 min (813.7 - 739.2)

Volume	Invert	Avail.Storage	Storage Description
#1	96.70'	355 cf	**Custom Stage Data (Conic)** Listed below (Recalc) x 3 1,140 cf Overall - 252 cf Embedded = 888 cf x 40.0% Voids
#2	97.70'	252 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 3 Inside #1
		607 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
96.70	95	0	0	95
97.70	95	95	95	130
98.70	95	95	190	164
99.70	95	95	285	199
100.70	95	95	380	233

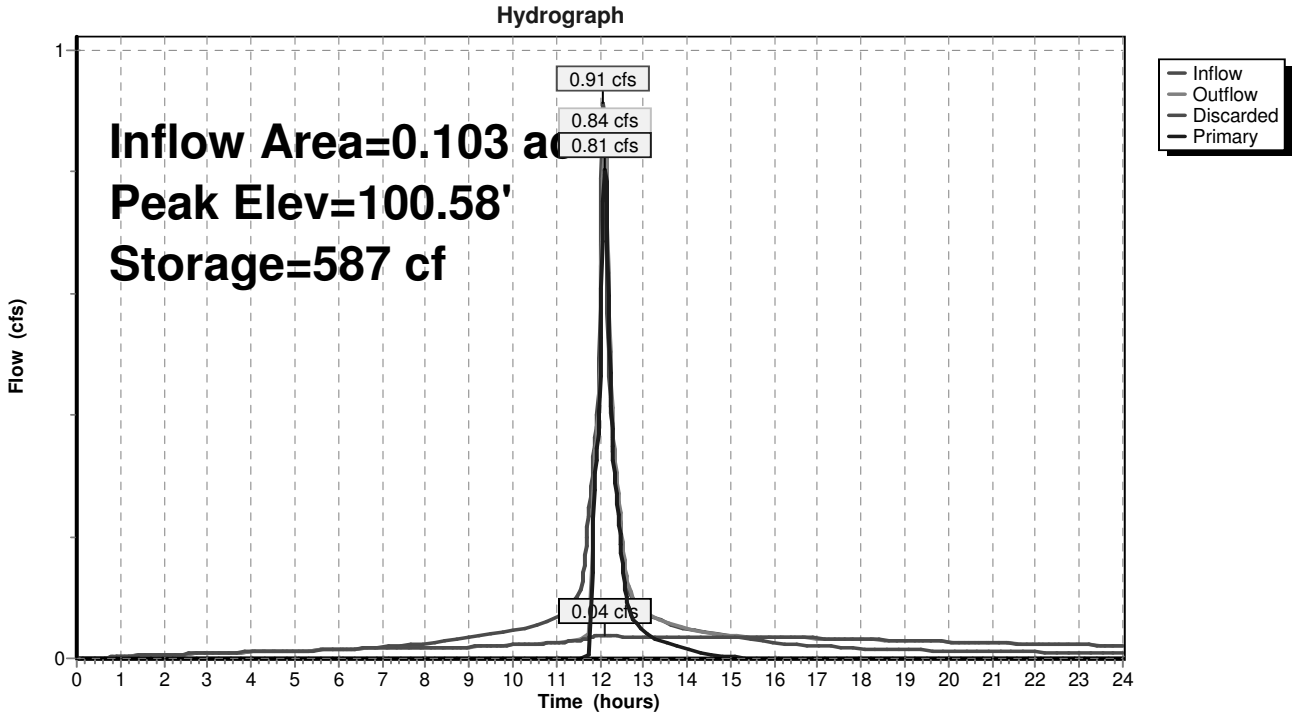
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.70	28	0	0
98.70	28	28	28
99.70	28	28	56
100.70	28	28	84

Device	Routing	Invert	Outlet Devices
#1	Discarded	96.70'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	100.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 12.12 hrs HW=100.57' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.80 cfs @ 12.12 hrs HW=100.57' TW=92.82' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 3.07 fps)

Pond 1P: Existing Drywells



Summary for Pond 2P: Existing Subsurface

Inflow Area = 0.862 ac, 53.28% Impervious, Inflow Depth > 4.81" for 100-Yr. Event event
Inflow = 4.77 cfs @ 12.13 hrs, Volume= 0.345 af
Outflow = 4.31 cfs @ 12.18 hrs, Volume= 0.317 af, Atten= 10%, Lag= 2.9 min
Discarded = 0.05 cfs @ 12.18 hrs, Volume= 0.050 af
Primary = 4.26 cfs @ 12.18 hrs, Volume= 0.268 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 93.07' @ 12.18 hrs Surf.Area= 468 sf Storage= 1,749 cf

Plug-Flow detention time= 55.0 min calculated for 0.317 af (92% of inflow)
Center-of-Mass det. time= 14.7 min (834.8 - 820.0)

Volume	Invert	Avail.Storage	Storage Description
#1	88.33'	322 cf	**Stone (Conic)** Listed below (Recalc) 2,340 cf Overall - 1,536 cf Embedded = 804 cf x 40.0% Voids
#2	89.33'	1,536 cf	**24 4x4x4 galleys (Prismatic)** Listed below (Recalc) Inside #1
		1,858 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.33	468	0	0	468
89.33	468	468	468	545
90.33	468	468	936	621
91.33	468	468	1,404	698
92.33	468	468	1,872	775
93.33	468	468	2,340	851

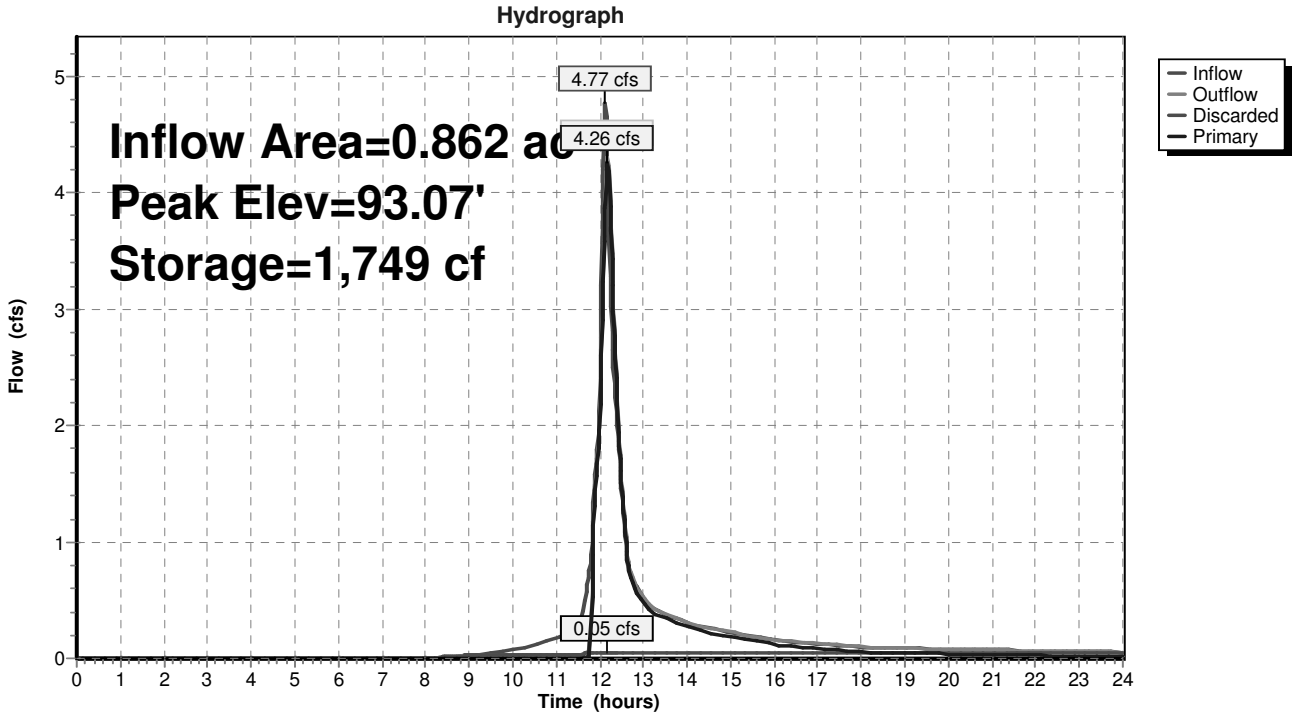
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
89.33	384	0	0
90.33	384	384	384
91.33	384	384	768
92.33	384	384	1,152
93.33	384	384	1,536

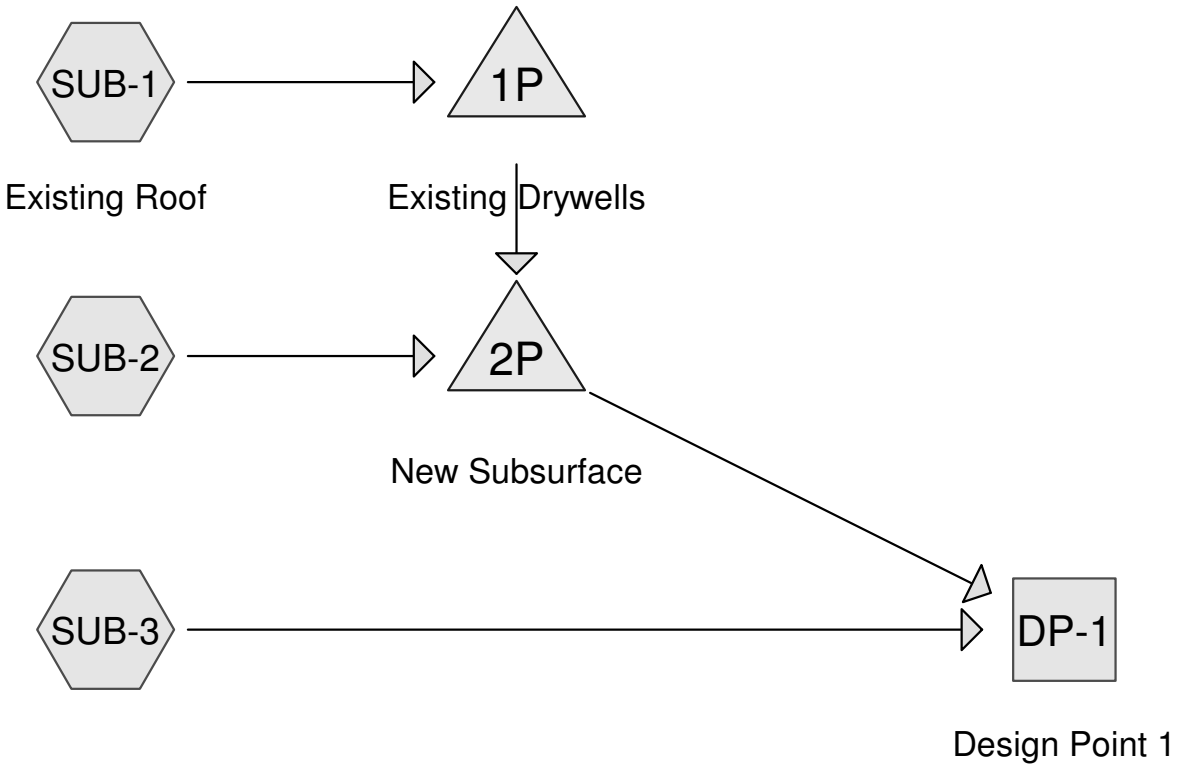
Device	Routing	Invert	Outlet Devices
#1	Discarded	88.33'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	91.80'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.18 hrs HW=93.07' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=4.26 cfs @ 12.18 hrs HW=93.07' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 4.26 cfs @ 5.42 fps)

Pond 2P: Existing Subsurface





Subcat Reach Pond Link

Drainage Diagram for POSTCONST

Prepared by Morse Engineering Company, Inc., Printed 9/23/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.293	30	Woods, Good, HSG A (SUB-3)
0.403	39	>75% Grass cover, Good, HSG A (SUB-2)
0.487	87	Reclaimed asphalt, HSG A (SUB-3)
0.472	98	Pavement (SUB-2, SUB-3)
0.580	98	Roof (SUB-1, SUB-2, SUB-3)
2.235		**TOTAL AREA**

Summary for Subcatchment SUB-1: Existing Roof

Runoff = 0.34 cfs @ 12.08 hrs, Volume= 0.027 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr. Event Rainfall=3.39"

	Area (sf)	CN	Description
*	4,493	98	Roof
	4,493		100.00% Impervious Area

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

Summary for Subcatchment SUB-2:

Runoff = 1.93 cfs @ 12.14 hrs, Volume= 0.155 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr. Event Rainfall=3.39"

	Area (sf)	CN	Description
*	19,763	98	Roof
*	17,547	98	Pavement
	17,559	39	>75% Grass cover, Good, HSG A
	54,869	79	Weighted Average
	17,559		32.00% Pervious Area
	37,310		68.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	190	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	240	Total			

Summary for Subcatchment SUB-3:

Runoff = 0.64 cfs @ 12.21 hrs, Volume= 0.064 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr. Event Rainfall=3.39"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	3,019	98	Pavement
*	21,197	87	Reclaimed asphalt, HSG A
	0	39	>75% Grass cover, Good, HSG A
	12,751	30	Woods, Good, HSG A
	37,980	69	Weighted Average
	33,948		89.38% Pervious Area
	4,032		10.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.7	270	0.0280	1.67		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
13.5	320	Total			

Summary for Reach DP-1: Design Point 1

Inflow Area = 2.235 ac, 47.09% Impervious, Inflow Depth > 0.40" for 2-Yr. Event event
Inflow = 0.64 cfs @ 12.21 hrs, Volume= 0.074 af
Outflow = 0.64 cfs @ 12.21 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Summary for Pond 1P: Existing Drywells

Inflow Area = 0.103 ac,100.00% Impervious, Inflow Depth > 3.15" for 2-Yr. Event event
Inflow = 0.34 cfs @ 12.08 hrs, Volume= 0.027 af
Outflow = 0.03 cfs @ 12.84 hrs, Volume= 0.027 af, Atten= 90%, Lag= 45.4 min
Discarded = 0.03 cfs @ 12.84 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 99.79' @ 12.84 hrs Surf.Area= 285 sf Storage= 457 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 117.4 min (872.1 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	96.70'	355 cf	**Custom Stage Data (Conic)** Listed below (Recalc) x 3 1,140 cf Overall - 252 cf Embedded = 888 cf x 40.0% Voids
#2	97.70'	252 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 3 Inside #1
		607 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
96.70	95	0	0	95
97.70	95	95	95	130
98.70	95	95	190	164
99.70	95	95	285	199
100.70	95	95	380	233

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.70	28	0	0
98.70	28	28	28
99.70	28	28	56
100.70	28	28	84

Device	Routing	Invert	Outlet Devices
#1	Discarded	96.70'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	100.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 12.84 hrs HW=99.79' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=96.70' TW=94.50' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 2P: New Subsurface

Inflow Area = 1.363 ac, 70.42% Impervious, Inflow Depth > 1.37" for 2-Yr. Event event
Inflow = 1.93 cfs @ 12.14 hrs, Volume= 0.155 af
Outflow = 0.18 cfs @ 13.74 hrs, Volume= 0.120 af, Atten= 91%, Lag= 96.5 min
Discarded = 0.11 cfs @ 13.74 hrs, Volume= 0.111 af
Primary = 0.07 cfs @ 13.74 hrs, Volume= 0.009 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 97.02' @ 13.74 hrs Surf.Area= 1,540 sf Storage= 3,200 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 181.9 min (1,026.7 - 844.8)

Volume	Invert	Avail.Storage	Storage Description
#1	94.50'	1,027 cf	**Stone (Conic)** Listed below (Recalc) 8,008 cf Overall - 5,440 cf Embedded = 2,568 cf x 40.0% Voids
#2	95.00'	5,440 cf	**85 4x4x4 galleys (Prismatic)** Listed below (Recalc) Inside #1
		6,467 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.50	1,540	0	0	1,540
95.50	1,540	1,540	1,540	1,679
96.50	1,540	1,540	3,080	1,818
97.50	1,540	1,540	4,620	1,957
98.50	1,540	1,540	6,160	2,096
99.20	1,540	1,078	7,238	2,194
99.70	1,540	770	8,008	2,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,360	0	0
96.00	1,360	1,360	1,360
97.00	1,360	1,360	2,720
98.00	1,360	1,360	4,080
99.00	1,360	1,360	5,440

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	96.90'	**15.0" Round Culvert** L= 310.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.90' / 93.50' S= 0.0110 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.11 cfs @ 13.74 hrs HW=97.02' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.07 cfs @ 13.74 hrs HW=97.02' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 0.07 cfs @ 1.78 fps)

Summary for Subcatchment SUB-1: Existing Roof

Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.042 af, Depth> 4.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr. Event Rainfall=5.08"

	Area (sf)	CN	Description
*	4,493	98	Roof
	4,493		100.00% Impervious Area

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

Summary for Subcatchment SUB-2:

Runoff = 3.78 cfs @ 12.13 hrs, Volume= 0.301 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr. Event Rainfall=5.08"

	Area (sf)	CN	Description
*	19,763	98	Roof
*	17,547	98	Pavement
	17,559	39	>75% Grass cover, Good, HSG A
	54,869	79	Weighted Average
	17,559		32.00% Pervious Area
	37,310		68.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	190	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	240	Total			

Summary for Subcatchment SUB-3:

Runoff = 1.58 cfs @ 12.19 hrs, Volume= 0.146 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr. Event Rainfall=5.08"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	3,019	98	Pavement
*	21,197	87	Reclaimed asphalt, HSG A
	0	39	>75% Grass cover, Good, HSG A
	12,751	30	Woods, Good, HSG A
	37,980	69	Weighted Average
	33,948		89.38% Pervious Area
	4,032		10.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.7	270	0.0280	1.67		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
13.5	320	Total			

Summary for Reach DP-1: Design Point 1

Inflow Area = 2.235 ac, 47.09% Impervious, Inflow Depth > 1.49" for 10-Yr. Event event
Inflow = 3.51 cfs @ 12.28 hrs, Volume= 0.278 af
Outflow = 3.51 cfs @ 12.28 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Summary for Pond 1P: Existing Drywells

Inflow Area = 0.103 ac,100.00% Impervious, Inflow Depth > 4.84" for 10-Yr. Event event
Inflow = 0.51 cfs @ 12.08 hrs, Volume= 0.042 af
Outflow = 0.35 cfs @ 12.17 hrs, Volume= 0.042 af, Atten= 31%, Lag= 5.2 min
Discarded = 0.04 cfs @ 12.17 hrs, Volume= 0.034 af
Primary = 0.32 cfs @ 12.17 hrs, Volume= 0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 100.23' @ 12.17 hrs Surf.Area= 285 sf Storage= 530 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 109.7 min (856.9 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1	96.70'	355 cf	**Custom Stage Data (Conic)** Listed below (Recalc) x 3 1,140 cf Overall - 252 cf Embedded = 888 cf x 40.0% Voids
#2	97.70'	252 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 3 Inside #1
		607 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
96.70	95	0	0	95
97.70	95	95	95	130
98.70	95	95	190	164
99.70	95	95	285	199
100.70	95	95	380	233

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.70	28	0	0
98.70	28	28	28
99.70	28	28	56
100.70	28	28	84

Device	Routing	Invert	Outlet Devices
#1	Discarded	96.70'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	100.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 12.17 hrs HW=100.23' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.31 cfs @ 12.17 hrs HW=100.23' TW=97.20' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 0.31 cfs @ 1.62 fps)

Summary for Pond 2P: New Subsurface

Inflow Area = 1.363 ac, 70.42% Impervious, Inflow Depth > 2.71" for 10-Yr. Event event
Inflow = 4.01 cfs @ 12.15 hrs, Volume= 0.308 af
Outflow = 2.30 cfs @ 12.31 hrs, Volume= 0.255 af, Atten= 43%, Lag= 9.9 min
Discarded = 0.11 cfs @ 12.31 hrs, Volume= 0.124 af
Primary = 2.19 cfs @ 12.31 hrs, Volume= 0.132 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 97.63' @ 12.31 hrs Surf.Area= 1,540 sf Storage= 4,080 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 70.6 min (894.4 - 823.8)

Volume	Invert	Avail.Storage	Storage Description
#1	94.50'	1,027 cf	**Stone (Conic)** Listed below (Recalc) 8,008 cf Overall - 5,440 cf Embedded = 2,568 cf x 40.0% Voids
#2	95.00'	5,440 cf	**85 4x4x4 galleys (Prismatic)** Listed below (Recalc) Inside #1
		6,467 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.50	1,540	0	0	1,540
95.50	1,540	1,540	1,540	1,679
96.50	1,540	1,540	3,080	1,818
97.50	1,540	1,540	4,620	1,957
98.50	1,540	1,540	6,160	2,096
99.20	1,540	1,078	7,238	2,194
99.70	1,540	770	8,008	2,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,360	0	0
96.00	1,360	1,360	1,360
97.00	1,360	1,360	2,720
98.00	1,360	1,360	4,080
99.00	1,360	1,360	5,440

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	96.90'	**15.0" Round Culvert** L= 310.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.90' / 93.50' S= 0.0110 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.11 cfs @ 12.31 hrs HW=97.63' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=2.18 cfs @ 12.31 hrs HW=97.63' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 2.18 cfs @ 2.92 fps)

Summary for Subcatchment SUB-1: Existing Roof

Runoff = 0.91 cfs @ 12.08 hrs, Volume= 0.076 af, Depth> 8.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr. Event Rainfall=9.04"

	Area (sf)	CN	Description
*	4,493	98	Roof
	4,493		100.00% Impervious Area

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

Summary for Subcatchment SUB-2:

Runoff = 8.40 cfs @ 12.13 hrs, Volume= 0.679 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr. Event Rainfall=9.04"

	Area (sf)	CN	Description
*	19,763	98	Roof
*	17,547	98	Pavement
	17,559	39	>75% Grass cover, Good, HSG A
	54,869	79	Weighted Average
	17,559		32.00% Pervious Area
	37,310		68.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	190	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	240	Total			

Summary for Subcatchment SUB-3:

Runoff = 4.22 cfs @ 12.19 hrs, Volume= 0.380 af, Depth> 5.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr. Event Rainfall=9.04"

	Area (sf)	CN	Description
*	1,013	98	Roof
*	3,019	98	Pavement
*	21,197	87	Reclaimed asphalt, HSG A
	0	39	>75% Grass cover, Good, HSG A
	12,751	30	Woods, Good, HSG A
	37,980	69	Weighted Average
	33,948		89.38% Pervious Area
	4,032		10.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.7	270	0.0280	1.67		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
13.5	320	Total			

Summary for Reach DP-1: Design Point 1

Inflow Area = 2.235 ac, 47.09% Impervious, Inflow Depth > 4.70" for 100-Yr. Event event
Inflow = 11.04 cfs @ 12.19 hrs, Volume= 0.876 af
Outflow = 11.04 cfs @ 12.19 hrs, Volume= 0.876 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Summary for Pond 1P: Existing Drywells

Inflow Area = 0.103 ac,100.00% Impervious, Inflow Depth > 8.79" for 100-Yr. Event event
Inflow = 0.91 cfs @ 12.08 hrs, Volume= 0.076 af
Outflow = 0.84 cfs @ 12.12 hrs, Volume= 0.074 af, Atten= 8%, Lag= 2.0 min
Discarded = 0.04 cfs @ 12.12 hrs, Volume= 0.044 af
Primary = 0.81 cfs @ 12.12 hrs, Volume= 0.030 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 100.58' @ 12.12 hrs Surf.Area= 285 sf Storage= 587 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 74.4 min (813.7 - 739.2)

Volume	Invert	Avail.Storage	Storage Description
#1	96.70'	355 cf	**Custom Stage Data (Conic)** Listed below (Recalc) x 3 1,140 cf Overall - 252 cf Embedded = 888 cf x 40.0% Voids
#2	97.70'	252 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 3 Inside #1
		607 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
96.70	95	0	0	95
97.70	95	95	95	130
98.70	95	95	190	164
99.70	95	95	285	199
100.70	95	95	380	233

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.70	28	0	0
98.70	28	28	28
99.70	28	28	56
100.70	28	28	84

Device	Routing	Invert	Outlet Devices
#1	Discarded	96.70'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	100.00'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 12.12 hrs HW=100.57' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.80 cfs @ 12.12 hrs HW=100.57' TW=98.57' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 3.07 fps)

Summary for Pond 2P: New Subsurface

Inflow Area = 1.363 ac, 70.42% Impervious, Inflow Depth > 6.25" for 100-Yr. Event event
Inflow = 9.20 cfs @ 12.13 hrs, Volume= 0.709 af
Outflow = 6.97 cfs @ 12.22 hrs, Volume= 0.639 af, Atten= 24%, Lag= 5.3 min
Discarded = 0.12 cfs @ 12.22 hrs, Volume= 0.144 af
Primary = 6.85 cfs @ 12.22 hrs, Volume= 0.495 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 98.97' @ 12.22 hrs Surf.Area= 1,540 sf Storage= 5,989 cf

Plug-Flow detention time= 72.5 min calculated for 0.639 af (90% of inflow)
Center-of-Mass det. time= 25.5 min (825.6 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1	94.50'	1,027 cf	**Stone (Conic)** Listed below (Recalc) 8,008 cf Overall - 5,440 cf Embedded = 2,568 cf x 40.0% Voids
#2	95.00'	5,440 cf	**85 4x4x4 galleys (Prismatic)** Listed below (Recalc) Inside #1
		6,467 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.50	1,540	0	0	1,540
95.50	1,540	1,540	1,540	1,679
96.50	1,540	1,540	3,080	1,818
97.50	1,540	1,540	4,620	1,957
98.50	1,540	1,540	6,160	2,096
99.20	1,540	1,078	7,238	2,194
99.70	1,540	770	8,008	2,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,360	0	0
96.00	1,360	1,360	1,360
97.00	1,360	1,360	2,720
98.00	1,360	1,360	4,080
99.00	1,360	1,360	5,440

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	96.90'	**15.0" Round Culvert** L= 310.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.90' / 93.50' S= 0.0110 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.12 cfs @ 12.22 hrs HW=98.96' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=6.84 cfs @ 12.22 hrs HW=98.96' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 6.84 cfs @ 5.58 fps)

PLANS

- Watershed Delineation Plan