STORMWATER MANAGEMENT REPORT

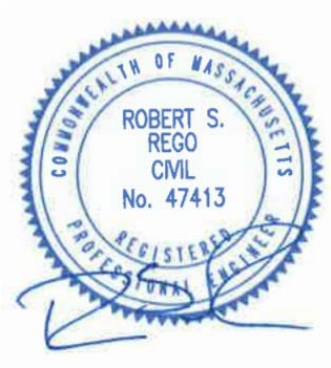
Proposed Commercial Development Project
Map 49, Block 62, Lot 7-R, Forest Street
Carver, Massachusetts

PREPARED FOR:

Priolo Concrete Forms, Inc.
233 Pembroke Street
Kingston, Massachusetts 02364

PREPARED BY:

River Hawk Environmental, LLC
2183 Ocean Street
Marshfield, Massachusetts 02050



June 9, 2022

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1.0 INTRODUCTION

River Hawk Environmental, LLC (RHE) has prepared this Stormwater Management Report (SMR) to document compliance with the MassDEP Stormwater Management Standards (SMS) and to describe stormwater management and erosion controls to be implemented prior to, during and after construction of the proposed commercial development project located at Map 49, Block 62, Lot 7-R, Carver, MA (Subject Property).

1.1 Existing Conditions

The Subject Property is currently an unimproved vacant wooded lot. For modeling purposes the Subject Property was divided into two subcatchment areas. Currently, the surface water runoff from the western portion of the Site drains off the site to the north. The stormwater from the eastern portion of the Site flows overland to the east toward Forest Street where it is discharged off-site without control or treatment.

Based on a review of the Bristol County Soil Survey published by the National Soil Conservation Service (NSCS), the soils at the Subject Property are classified as either Plymouth loamy coarse sand or Hinckley loamy sand. Both Plymouth and Hinckley soils are excessively drained (Hydrologic Soil Group A).

1.2 Proposed Redevelopment

Development of the Subject Property will includ the construction of a single rectangular shaped building, associated utilities, stormwater controls, paved parking areas and access drives.

The stormwater treatment system is comprised of a series of interconnected stormwater Best Management Practices (BMPs). Catch basins will be installed to collect runoff from the parking areas and drives. The catch basins will drain to one of two proprietary stormwater treatment units (CDS_2015). Treated effluent from the treatment units will be discharged into a subsurface infiltration gallery (Dry-Well 1) located beneath the eastern portion of the Subject Property. The Dry Well has been designed to retain all runoff from its contributing area for all storms up to the 100-year design storm. Untreated runoff from the roof of the proposed building will also be directed to a second infiltration gallery (Dry-Well 2) located beneath the central portion of the Subject Property.

With the introduction of the proposed drainage improvements, the proposed development will result in a decrease in the rate and an improvement of the water-quality of the stormwater infiltrated and/or discharged off-site.

2.0 COMPLIANCE WITH MASSDEP STORMWATER MANAGEMENT STANDARDS

This section of the report provides the requisite documentation that each of the Stormwater Management Standards are being met in accordance with Volume 3 of the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Manual. A copy of the MassDEP Stormwater Checklist is included in Appendix A.

Standard 1 - No Untreated Discharges:
Standard 1 requires that there be no untreated storm discharges and that there be no erosion to wetlands. As shown on the site plans, there will be no direct discharges to wetlands from the Subject Property and none of the outfalls will be subject to erosion; therefore, Standard 1 will be met.

Standard 2 - Peak Rate Attenuation:
Standard 2 requires stormwater management systems to be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. Standard 2 also requires that the impact of peak discharges from the 100-year 24-hour storm be evaluated. As documented below, there will be no increase in the rate of flow for the 2-, 10-, or 100-year storm events. The proposed redevelopment will provide a reduction in the peak rate of runoff versus the rate under existing conditions; therefore, Standard 2 will be met.

The results of the storm water modeling are presented in Appendix B and summarized in the following Tables. The values presented represent the flow off-site.

Stormwater Summary for 2 to 100-Year Design Storms

Summary Point 1 - East of Subject Property

	Peak Rate Runoff Discharged Off-Site (2-year)	Peak Rate Runoff Discharged Off-Site (10-year)	Peak Rate Runoff Discharged Off-Site (100-year)
Pre-Development	**0.00 cfs**	**0.00 cfs**	**0.06 cfs**
Post-Development	**0.00 cfs**	**0.00 cfs**	**0.00 cfs**

Summary Point 2 - North of Subject Property

	Peak Rate Runoff Discharged Off-Site (2-year)	Peak Rate Runoff Discharged Off-Site (10-year)	Peak Rate Runoff Discharged Off-Site (100-year)
Pre-Development	**0.00 cfs**	**0.00 cfs**	**0.01 cfs**
Post-Development	**0.00 cfs**	**0.00 cfs**	**0.01 cfs**

The computer modeling output indicates the peak flows discharged off-site have been reduced for post-development conditions for the 2-year, 10-year, and 100-year design storms. The proposed redevelopment will provide a reduction in the peak rate of runoff versus the rate under existing conditions; therefore, Standard 2 will be met.

Standard 3 - Stormwater Recharge:
The loss of annual recharge to groundwater will be eliminated at the Subject Property through the use of infiltration measures, low impact development techniques, stormwater best management practices, and good operation and maintenance.

Standard 3 requires at a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume (R_e) as determined in accordance with the Massachusetts Stormwater Handbook (MSH). The R_e associated with the redevelopment of the Subject Property was determined using the method prescribed in the MSH.

The soils at the Subject Property are classified as Hydrologic Soil Group A. The recharge volume for Hydrologic Soil Group A is 0.6 inches x the total impervious area. The recharge volume (R_e) is as follows: 42,921 s.f. x 0.6 inches = 2146 cubic feet. The proposed Dry Wells have the capacity to store and infiltrate approximately 8,800 c.f. Therefore, there is more than enough capacity to store and infiltrate the required recharge volume. Therefore, Standard 3 will be met.

Standard 4 - Water Quality:
Standard 4 requires removal of 80% of total suspended solids (TSS) from the stormwater runoff. Under post-development conditions, most of the runoff from the site will be collected and treated. The runoff will be collected in deep-sump catch basins, treated in a proprietary stormwater treatment unit, and infiltrated through an on-site Dry-Well.

BMP	TSS Removal Rate	Initial Pollution Load	Amount Removed	Remaining Load
Deep Sump Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
CDS 2015_4	**0.84**	**0.75**	**0.63**	**0.12**
Dry-Well	**0.80**	**0.12**	**0.10**	**0.02**
Total Removal			**98%**	

The proposed stormwater BMPs will result in the removal of a minimum of 98% of the TSS from stormwater runoff generated at the Site. Standard 4 will, therefore, be met.

Standard 5 - Land And Uses With Higher Pollution Loads:
The proposed development is not considered a land use with a higher pollution load; therefore, Standard 5 will be met.

Standard 6 - Critical Areas:
The Subject Property does not discharge stormwater to Critical Areas; therefore, Standard 6 will be met.

Standard 7 - Redevelopment Project:
Qualified redevelopment projects are allowed to only meet standards 1 through 6 to the "maximum extent practicable". The proposed development does not qualify as a redevelopment project since it will result in a net increase in impervious area. Therefore, the Project is required to meet all of the Stormwater Management Standards.

Standard 8 - Construction Period Controls:
Standard 8 requires the preparation and implementation of an erosion and sediment control program for the site construction phase. Since the proposed project will result in the disturbance of greater that 1 acre, Stormwater discharges from the Project are subject to the NPDES Construction General Permit. A Notice of Intent (NOI) for coverage under the USEPA Construction General Permit will be filed with the USEPA prior to any earth disturbance at the Subject Property. A comprehensive Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to submition of the NOI. A Construction Phase Erosion and Sediment Control Plan has been developed and is included as Appendix C. The Construction Phase Erosion and Sediment Control Plan is in full compliance with Standard 8.

Standard 9 - Long Term Operation and Maintenance Program:
Standard 9 requires the preparation of an ongoing program to maintain the stormwater quality and quantity controls in optimal operating condition. Appendix D presents a Long Term Operation and Maintenance Program which is in full compliance with Standard 9, therefore, Standard 9 will be met.

Standard 10 - Prohibition of Illicit Discharges:
Standard 10 prohibits illicit discharges to Stormwater Management Systems. A final illicit discharge statement shall be provided when construction is complete.

APPENDIX A

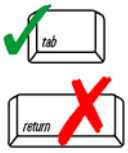
CHECKLIST FOR STORMWATER REPORT

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.

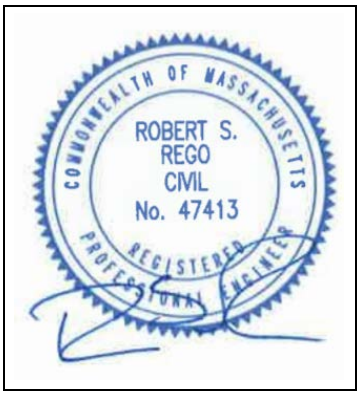
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

- ☒ 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 B

DRAINAGE CALCULATIONS

NOAA Atlas 14, Volume 10, Version 3
Location name: Carver, Massachusetts, USA*
Latitude: 41.8996°, Longitude: -70.7955°
Elevation: 118.33 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.297 (0.240-0.365)	0.369 (0.297-0.454)	0.487 (0.391-0.600)	0.584 (0.466-0.723)	0.719 (0.555-0.925)	0.819 (0.619-1.07)	0.927 (0.681-1.25)	1.06 (0.725-1.43)	1.25 (0.823-1.74)	1.41 (0.909-1.99)
10-min	0.421 (0.339-0.517)	0.523 (0.421-0.643)	0.690 (0.554-0.851)	0.828 (0.661-1.02)	1.02 (0.786-1.31)	1.16 (0.877-1.52)	1.31 (0.965-1.77)	1.50 (1.03-2.03)	1.77 (1.17-2.46)	2.00 (1.29-2.83)
15-min	0.495 (0.399-0.608)	0.615 (0.496-0.757)	0.811 (0.651-1.00)	0.975 (0.777-1.21)	1.20 (0.925-1.54)	1.37 (1.03-1.79)	1.55 (1.14-2.09)	1.76 (1.21-2.38)	2.08 (1.37-2.89)	2.36 (1.52-3.32)
30-min	0.702 (0.566-0.863)	0.872 (0.703-1.07)	1.15 (0.922-1.42)	1.38 (1.10-1.71)	1.70 (1.31-2.18)	1.94 (1.46-2.53)	2.19 (1.61-2.96)	2.49 (1.71-3.38)	2.95 (1.94-4.10)	3.34 (2.15-4.70)
60-min	0.910 (0.733-1.12)	1.13 (0.910-1.39)	1.49 (1.20-1.84)	1.79 (1.43-2.21)	2.20 (1.70-2.83)	2.50 (1.89-3.28)	2.83 (2.08-3.83)	3.22 (2.22-4.37)	3.81 (2.51-5.30)	4.31 (2.77-6.08)
2-hr	1.19 (0.965-1.45)	1.49 (1.21-1.82)	1.98 (1.60-2.42)	2.39 (1.92-2.94)	2.95 (2.30-3.77)	3.37 (2.57-4.38)	3.82 (2.84-5.14)	4.37 (3.03-5.87)	5.22 (3.48-7.19)	5.95 (3.87-8.31)
3-hr	1.39 (1.13-1.69)	1.74 (1.42-2.12)	2.31 (1.87-2.81)	2.78 (2.24-3.40)	3.43 (2.69-4.36)	3.91 (3.00-5.06)	4.43 (3.32-5.94)	5.07 (3.54-6.78)	6.06 (4.06-8.30)	6.92 (4.53-9.60)
6-hr	1.83 (1.50-2.21)	2.25 (1.84-2.71)	2.93 (2.39-3.54)	3.49 (2.84-4.24)	4.27 (3.37-5.38)	4.85 (3.75-6.21)	5.47 (4.12-7.23)	6.22 (4.39-8.23)	7.36 (4.99-9.97)	8.32 (5.51-11.4)
12-hr	2.38 (1.97-2.85)	2.84 (2.35-3.41)	3.60 (2.97-4.33)	4.24 (3.47-5.11)	5.11 (4.05-6.36)	5.76 (4.48-7.28)	6.45 (4.87-8.38)	7.24 (5.17-9.48)	8.39 (5.76-11.3)	9.34 (6.26-12.7)
24-hr	2.90 (2.42-3.45)	3.43 (2.86-4.09)	4.31 (3.58-5.14)	5.04 (4.16-6.03)	6.04 (4.82-7.44)	6.79 (5.32-8.48)	7.58 (5.76-9.70)	8.45 (6.10-11.0)	9.68 (6.72-12.9)	10.7 (7.24-14.4)
2-day	3.32 (2.79-3.92)	3.96 (3.32-4.68)	5.01 (4.19-5.93)	5.88 (4.89-6.99)	7.08 (5.71-8.66)	7.98 (6.31-9.90)	8.93 (6.85-11.3)	9.98 (7.28-12.8)	11.5 (8.06-15.1)	12.7 (8.71-16.9)
3-day	3.63 (3.06-4.26)	4.31 (3.63-5.07)	5.43 (4.56-6.40)	6.36 (5.31-7.52)	7.63 (6.18-9.28)	8.60 (6.82-10.6)	9.60 (7.41-12.1)	10.7 (7.86-13.7)	12.3 (8.68-16.0)	13.5 (9.36-17.9)
4-day	3.91 (3.30-4.58)	4.61 (3.90-5.40)	5.76 (4.85-6.77)	6.71 (5.62-7.91)	8.02 (6.52-9.72)	9.02 (7.18-11.1)	10.0 (7.77-12.6)	11.2 (8.24-14.2)	12.7 (9.06-16.6)	14.0 (9.74-18.5)
7-day	4.65 (3.96-5.42)	5.39 (4.58-6.28)	6.59 (5.59-7.70)	7.59 (6.40-8.89)	8.96 (7.33-10.8)	10.0 (8.02-12.2)	11.1 (8.61-13.7)	12.2 (9.09-15.4)	13.7 (9.87-17.7)	15.0 (10.5-19.5)
10-day	5.35 (4.58-6.21)	6.12 (5.22-7.10)	7.36 (6.26-8.56)	8.40 (7.11-9.80)	9.82 (8.06-11.7)	10.9 (8.77-13.2)	12.0 (9.36-14.8)	13.1 (9.85-16.5)	14.6 (10.6-18.8)	15.8 (11.2-20.5)
20-day	7.43 (6.40-8.56)	8.28 (7.12-9.54)	9.66 (8.29-11.2)	10.8 (9.22-12.5)	12.4 (10.2-14.6)	13.6 (11.0-16.2)	14.8 (11.6-18.0)	16.0 (12.1-19.9)	17.5 (12.8-22.2)	18.5 (13.2-23.8)
30-day	9.17 (7.93-10.5)	10.1 (8.71-11.6)	11.6 (9.98-13.3)	12.8 (11.0-14.8)	14.5 (12.1-17.1)	15.9 (12.9-18.8)	17.2 (13.5-20.6)	18.4 (14.0-22.7)	19.8 (14.6-25.0)	20.8 (15.0-26.6)
45-day	11.3 (9.86-12.9)	12.3 (10.7-14.1)	14.0 (12.1-16.0)	15.3 (13.2-17.6)	17.2 (14.4-20.1)	18.7 (15.3-22.0)	20.1 (15.9-24.0)	21.3 (16.4-26.2)	22.8 (16.9-28.6)	23.7 (17.2-30.2)
60-day	13.2 (11.5-15.0)	14.3 (12.4-16.2)	16.0 (13.9-18.3)	17.5 (15.1-20.0)	19.5 (16.3-22.6)	21.1 (17.3-24.7)	22.6 (17.9-26.7)	23.8 (18.4-29.1)	25.3 (18.9-31.5)	26.2 (19.1-33.1)

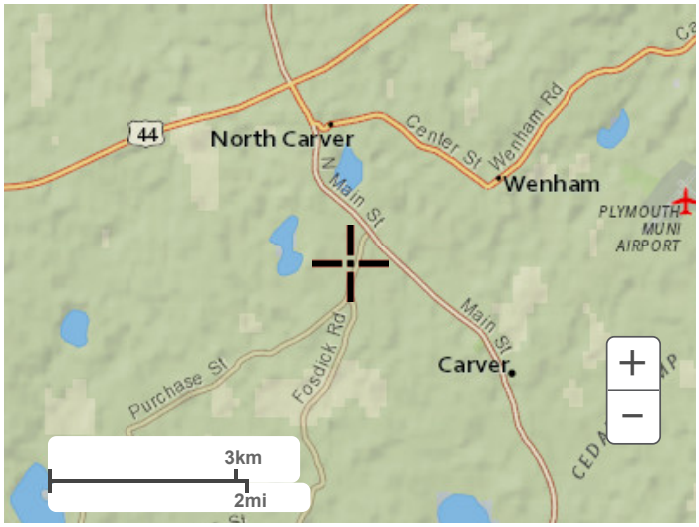
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

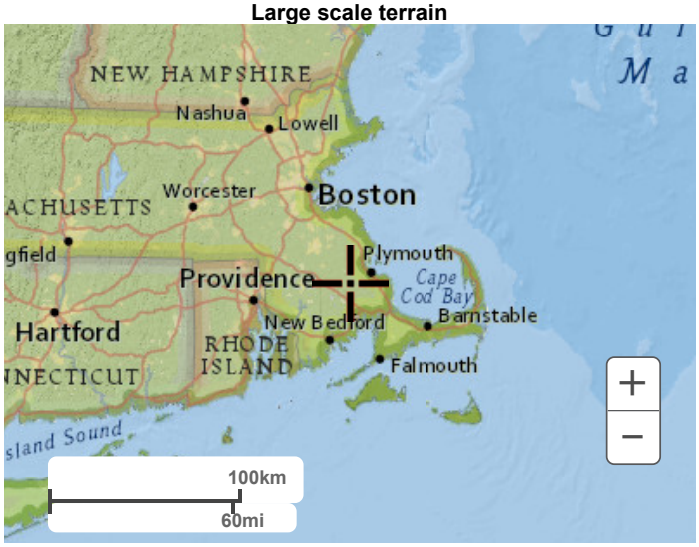
Please refer to NOAA Atlas 14 document for more information.

Back to Top

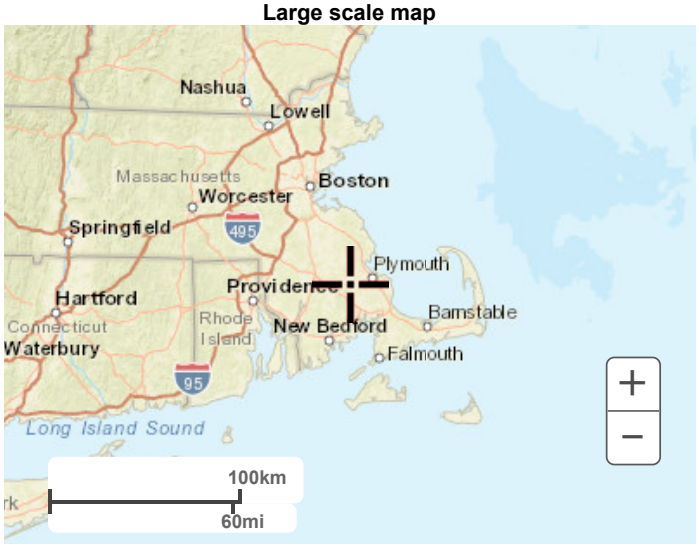
PF graphical



Large scale terrain



Large scale map



Large scale aerial

United States Department of Agriculture

NRCS

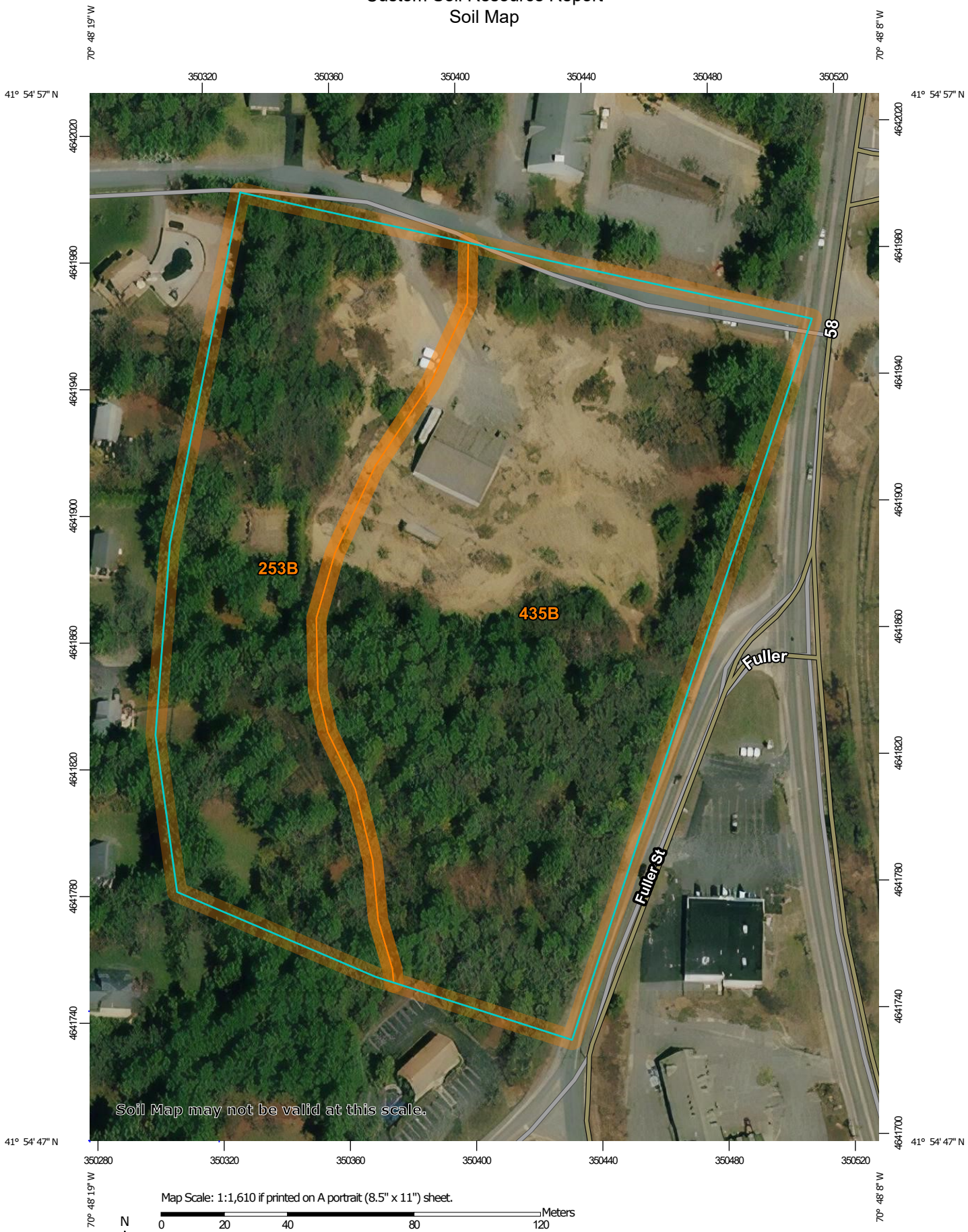
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Plymouth County, Massachusetts

May 31, 2022

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,610 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 14, Sep 2, 2021

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

Date(s) aerial images were photographed: Dec 31, 2009—Jul 3, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
253B	Hinckley loamy sand, 3 to 8 percent slopes	3.5	36.8%
435B	Plymouth loamy coarse sand, 3 to 8 percent slopes	6.0	63.2%
Totals for Area of Interest		**9.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Plymouth County, Massachusetts

253B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, kames, kame terraces, moraines, eskers, outwash plains
Landform position (two-dimensional): Summit, backslope, footslope, shoulder
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor
Percent of map unit: 8 percent
Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury
Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope, head slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Agawam
Percent of map unit: 2 percent
Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

435B—Plymouth loamy coarse sand, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2zggz
Elevation: 0 to 290 feet
Mean annual precipitation: 40 to 52 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 190 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition
Plymouth, loamy coarse sand, and similar soils: 80 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plymouth, Loamy Coarse Sand

Setting

Landform: Outwash plains, hills, moraines
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Crest, side slope, head slope, tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Linear, concave, convex
Parent material: Siliceous sandy and gravelly glaciofluvial deposits and/or sandy and gravelly supraglacial meltout till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 3 inches: loamy coarse sand
E - 3 to 5 inches: coarse sand
Bhs - 5 to 7 inches: cobbly loamy coarse sand
Bw1 - 7 to 11 inches: cobbly loamy coarse sand
Bw2 - 11 to 22 inches: gravelly coarse sand
BC - 22 to 31 inches: gravelly coarse sand
C1 - 31 to 43 inches: gravelly coarse sand
C2 - 43 to 66 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Montauk, sandy variant

Percent of map unit: 5 percent
Landform: Moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Ecological site: F149BY009MA - Well Drained Dense Till Uplands
Hydric soil rating: No

Carver

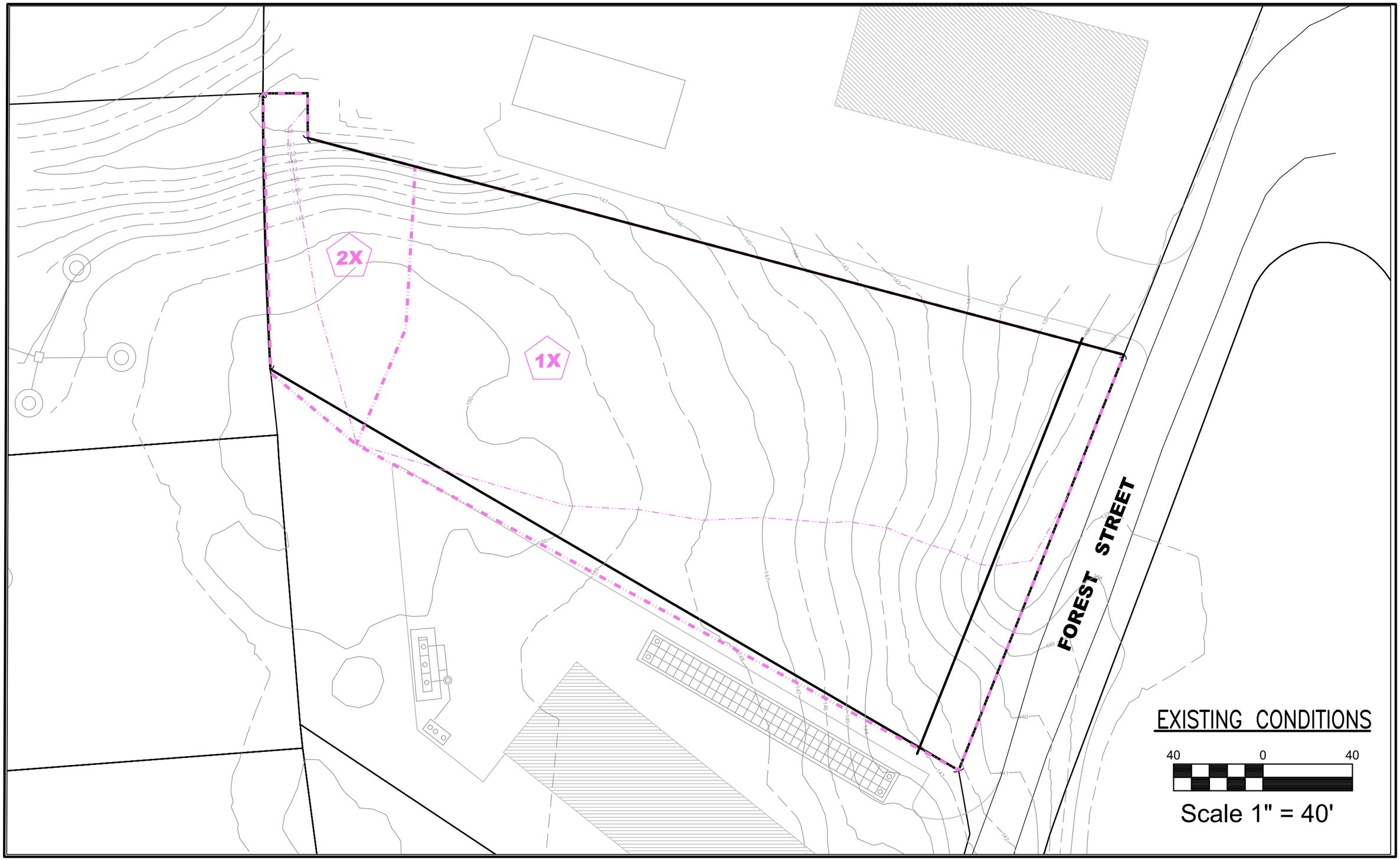
Percent of map unit: 5 percent
Landform: Outwash plains, moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, crest, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Riverhead

Percent of map unit: 5 percent
Landform: Outwash plains, moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, side slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Ecological site: F149BY006NY - Well Drained Outwash
Hydric soil rating: No

Barnstable

Percent of map unit: 5 percent
Landform: Moraines on outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Head slope, side slope, crest, tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Linear, concave, convex
Ecological site: F149BY011MA - Well Drained Till Uplands
Hydric soil rating: No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1X
FOREST STREET
EXISTING CONDITIONS
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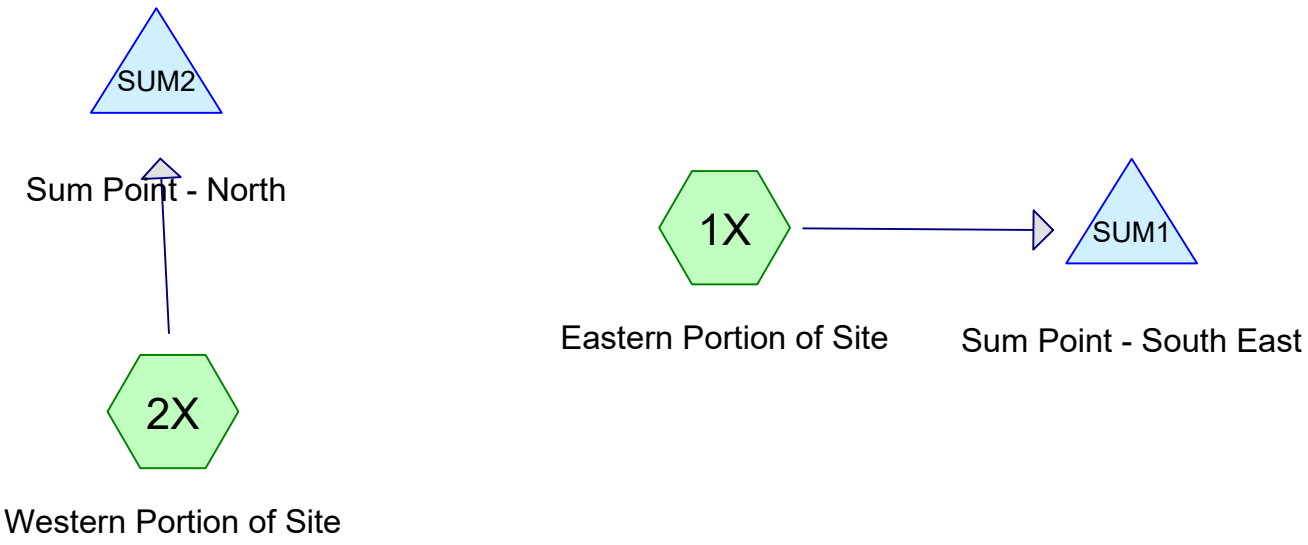


Subcat Reach Pond Link

Routing Diagram for 2022.05.31 - Priolo - Forest St - Exist Cond
Prepared by {enter your company name here}, Printed 6/9/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
58,076	30	Woods, Good, HSG A (1X, 2X)
58,076	**30**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
58,076	HSG A	1X, 2X
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
58,076		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
58,076	0	0	0	0	58,076	Woods, Good	1X, 2X
58,076	**0**	**0**	**0**	**0**	**58,076**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1X: Eastern Portion of Site Runoff Area=50,533 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=343' Tc=20.4 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 2X: Western Portion of Site Runoff Area=7,543 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=157' Tc=13.0 min CN=30 Runoff=0.00 cfs 0 cf

Pond SUM1: Sum Point - South East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond SUM2: Sum Point - North Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 58,076 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"
100.00% Pervious = 58,076 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1X: Eastern Portion of Site

[45] Hint: Runoff=Zero

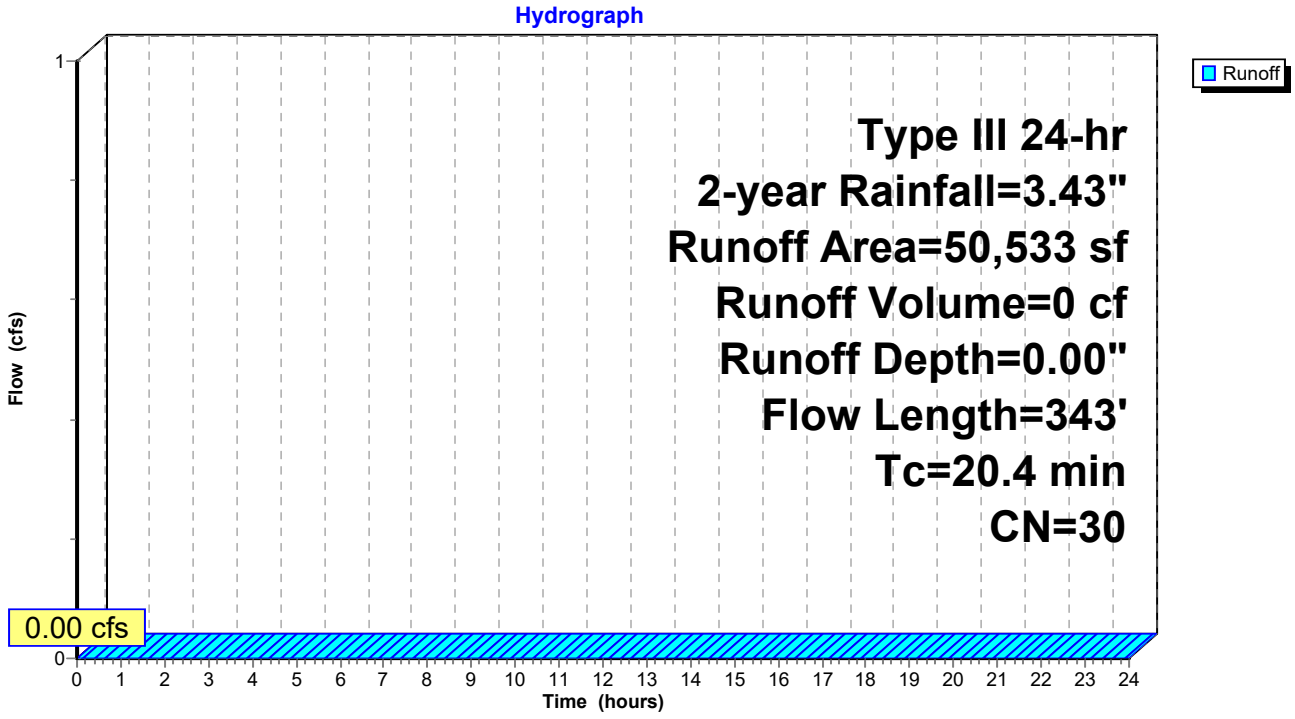
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.43"

Area (sf)	CN	Description
50,533	30	Woods, Good, HSG A
50,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
4.7	293	0.0440	1.05		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.4	343	Total			

Subcatchment 1X: Eastern Portion of Site



Summary for Subcatchment 2X: Western Portion of Site

[45] Hint: Runoff=Zero

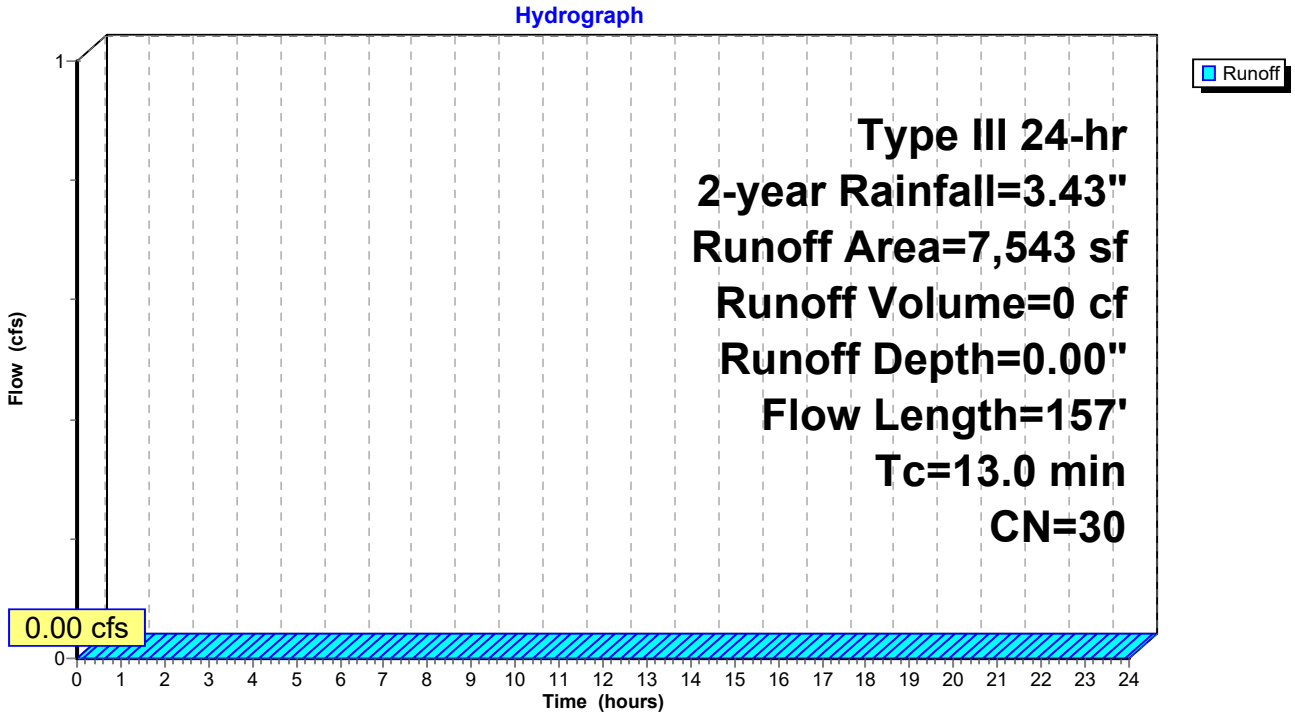
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.43"

Area (sf)	CN	Description
7,543	30	Woods, Good, HSG A
7,543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	107	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.0	157	Total			

Subcatchment 2X: Western Portion of Site



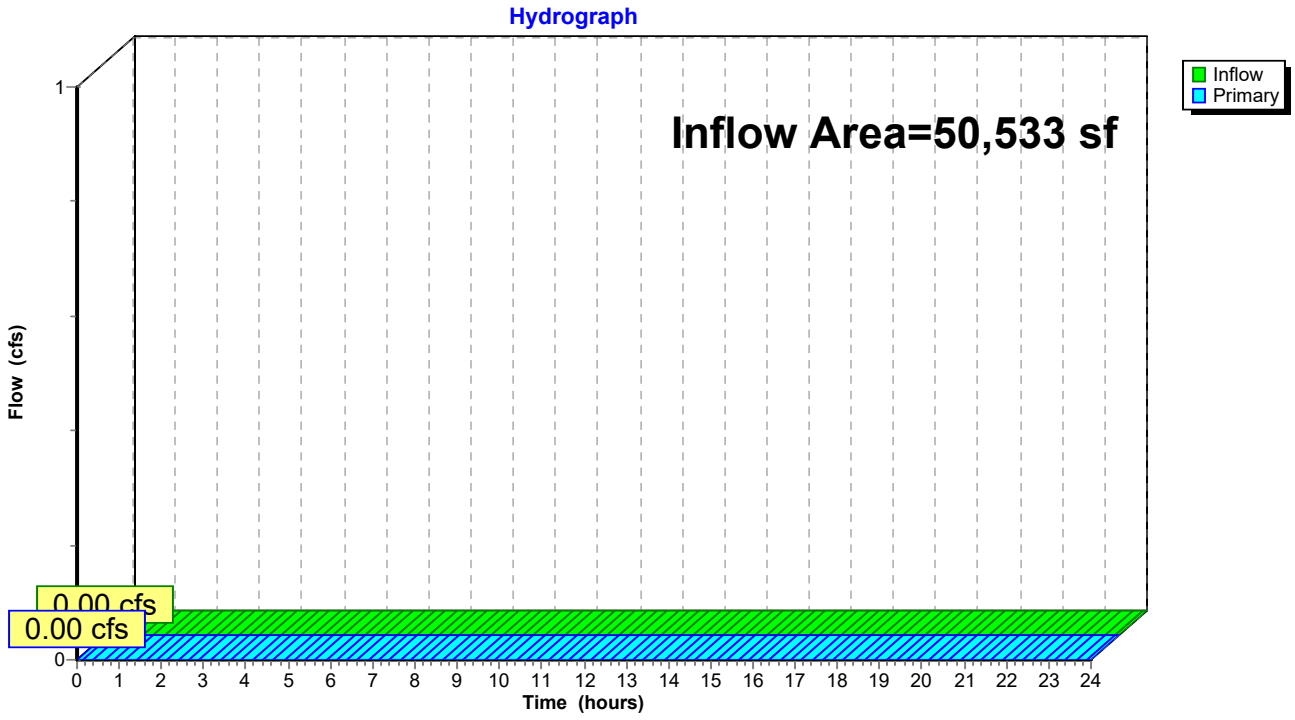
Summary for Pond SUM1: Sum Point - South East

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

Inflow Area = 50,533 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM1: Sum Point - South East



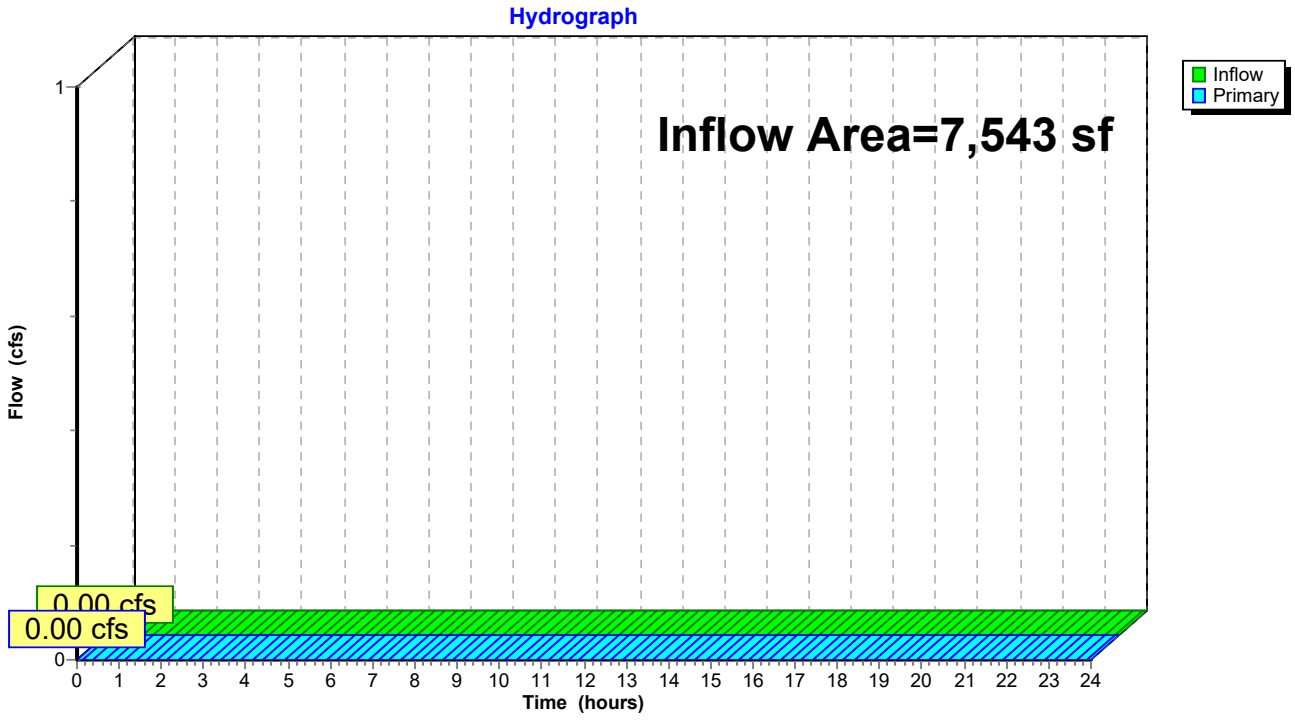
Summary for Pond SUM2: Sum Point - North

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

Inflow Area = 7,543 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM2: Sum Point - North



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1X: Eastern Portion of Site Runoff Area=50,533 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=343' Tc=20.4 min CN=30 Runoff=0.00 cfs 23 cf

Subcatchment 2X: Western Portion of Site Runoff Area=7,543 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=157' Tc=13.0 min CN=30 Runoff=0.00 cfs 4 cf

Pond SUM1: Sum Point - South East Inflow=0.00 cfs 23 cf
Primary=0.00 cfs 23 cf

Pond SUM2: Sum Point - North Inflow=0.00 cfs 4 cf
Primary=0.00 cfs 4 cf

Total Runoff Area = 58,076 sf Runoff Volume = 27 cf Average Runoff Depth = 0.01"
100.00% Pervious = 58,076 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1X: Eastern Portion of Site

[73] Warning: Peak may fall outside time span

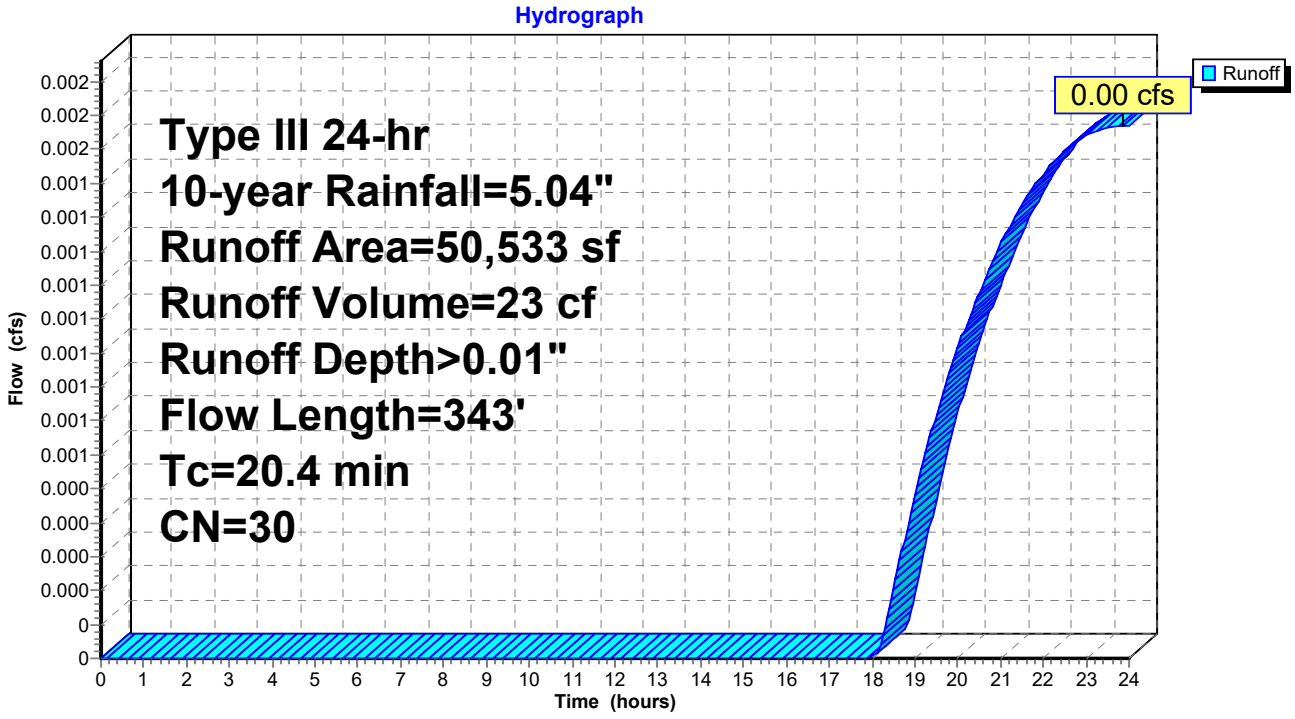
Runoff = 0.00 cfs @ 23.87 hrs, Volume= 23 cf, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
50,533	30	Woods, Good, HSG A
50,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
4.7	293	0.0440	1.05		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.4	343	Total			

Subcatchment 1X: Eastern Portion of Site



Summary for Subcatchment 2X: Western Portion of Site

[73] Warning: Peak may fall outside time span

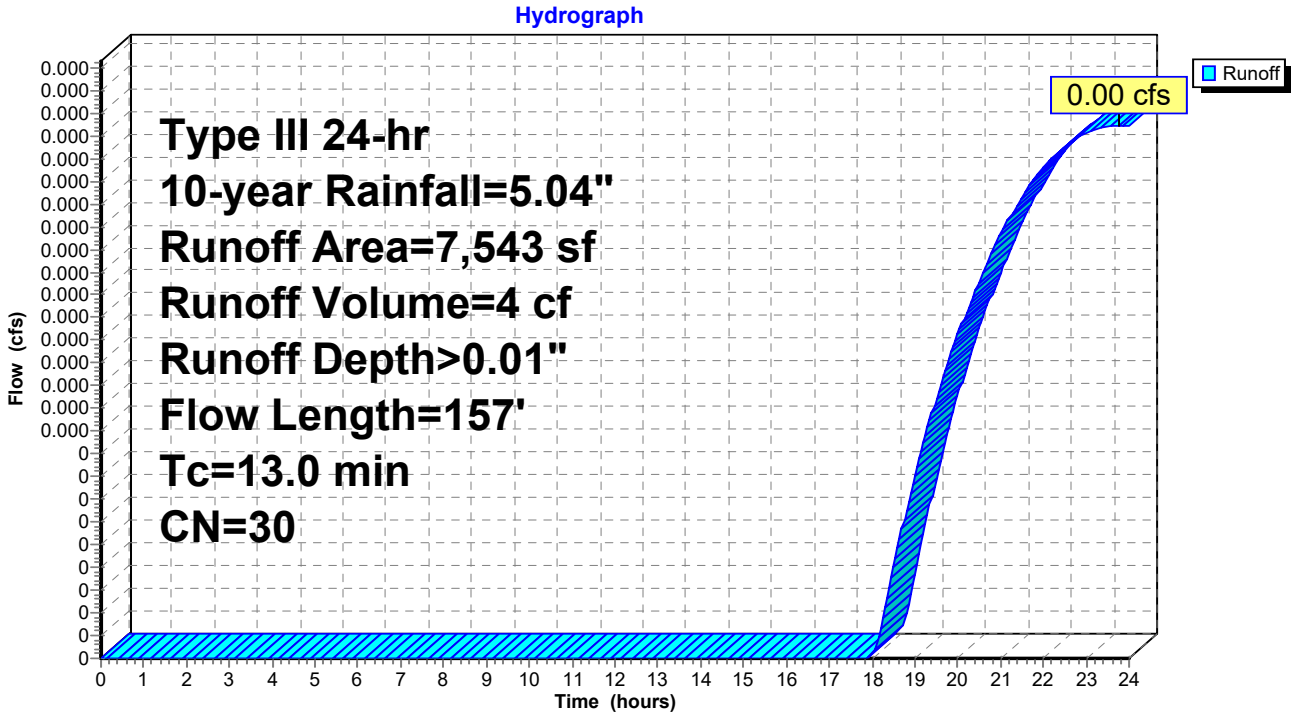
Runoff = 0.00 cfs @ 23.77 hrs, Volume= 4 cf, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
7,543	30	Woods, Good, HSG A
7,543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	107	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.0	157	Total			

Subcatchment 2X: Western Portion of Site



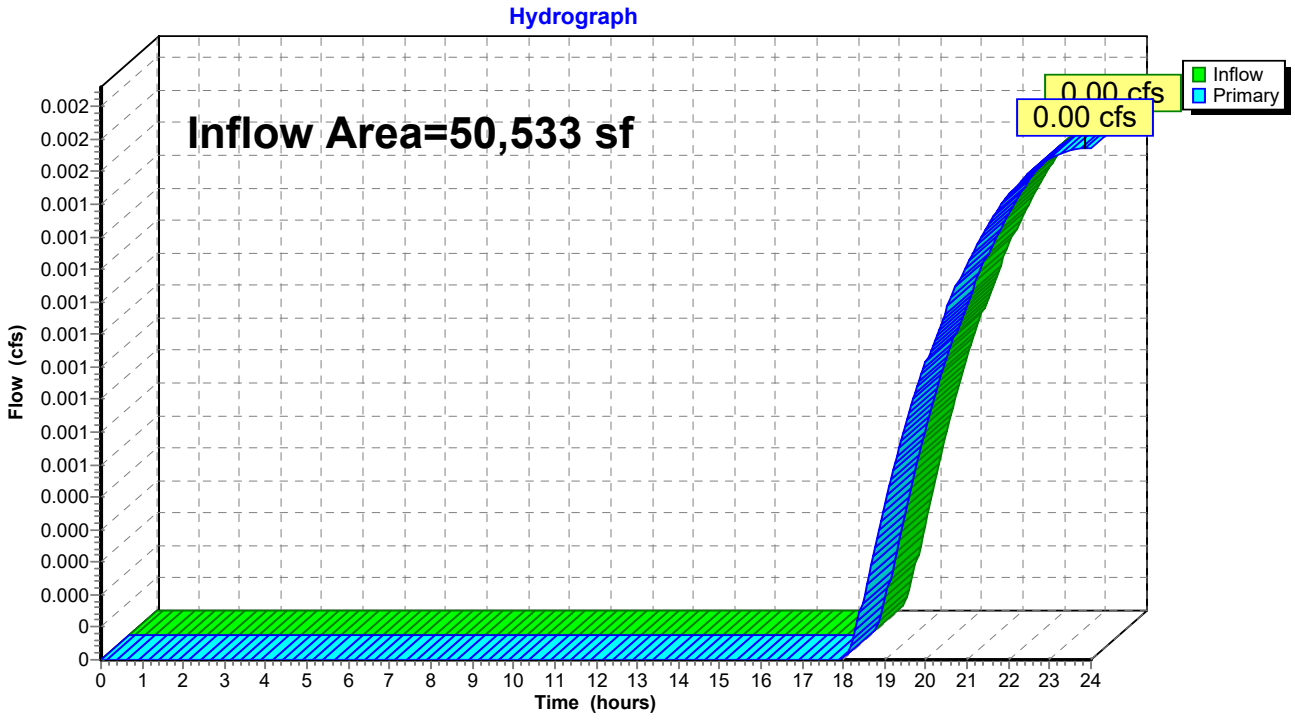
Summary for Pond SUM1: Sum Point - South East

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

Inflow Area = 50,533 sf, 0.00% Impervious, Inflow Depth > 0.01" for 10-year event
Inflow = 0.00 cfs @ 23.87 hrs, Volume= 23 cf
Primary = 0.00 cfs @ 23.87 hrs, Volume= 23 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM1: Sum Point - South East



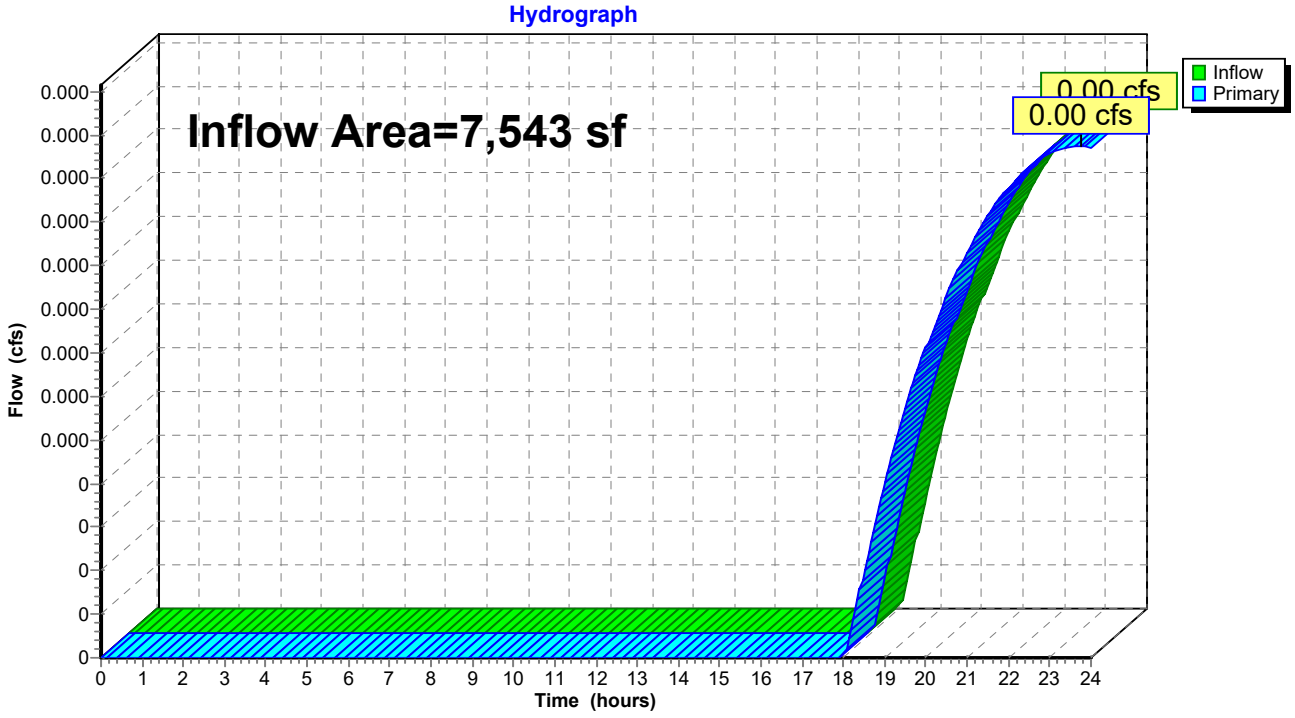
Summary for Pond SUM2: Sum Point - North

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

Inflow Area = 7,543 sf, 0.00% Impervious, Inflow Depth > 0.01" for 10-year event
Inflow = 0.00 cfs @ 23.77 hrs, Volume= 4 cf
Primary = 0.00 cfs @ 23.77 hrs, Volume= 4 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM2: Sum Point - North



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1X: Eastern Portion of Site Runoff Area=50,533 sf 0.00% Impervious Runoff Depth>0.32"
Flow Length=343' Tc=20.4 min CN=30 Runoff=0.06 cfs 1,345 cf

Subcatchment 2X: Western Portion of Site Runoff Area=7,543 sf 0.00% Impervious Runoff Depth>0.32"
Flow Length=157' Tc=13.0 min CN=30 Runoff=0.01 cfs 202 cf

Pond SUM1: Sum Point - South East Inflow=0.06 cfs 1,345 cf
Primary=0.06 cfs 1,345 cf

Pond SUM2: Sum Point - North Inflow=0.01 cfs 202 cf
Primary=0.01 cfs 202 cf

Total Runoff Area = 58,076 sf Runoff Volume = 1,547 cf Average Runoff Depth = 0.32"
100.00% Pervious = 58,076 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1X: Eastern Portion of Site

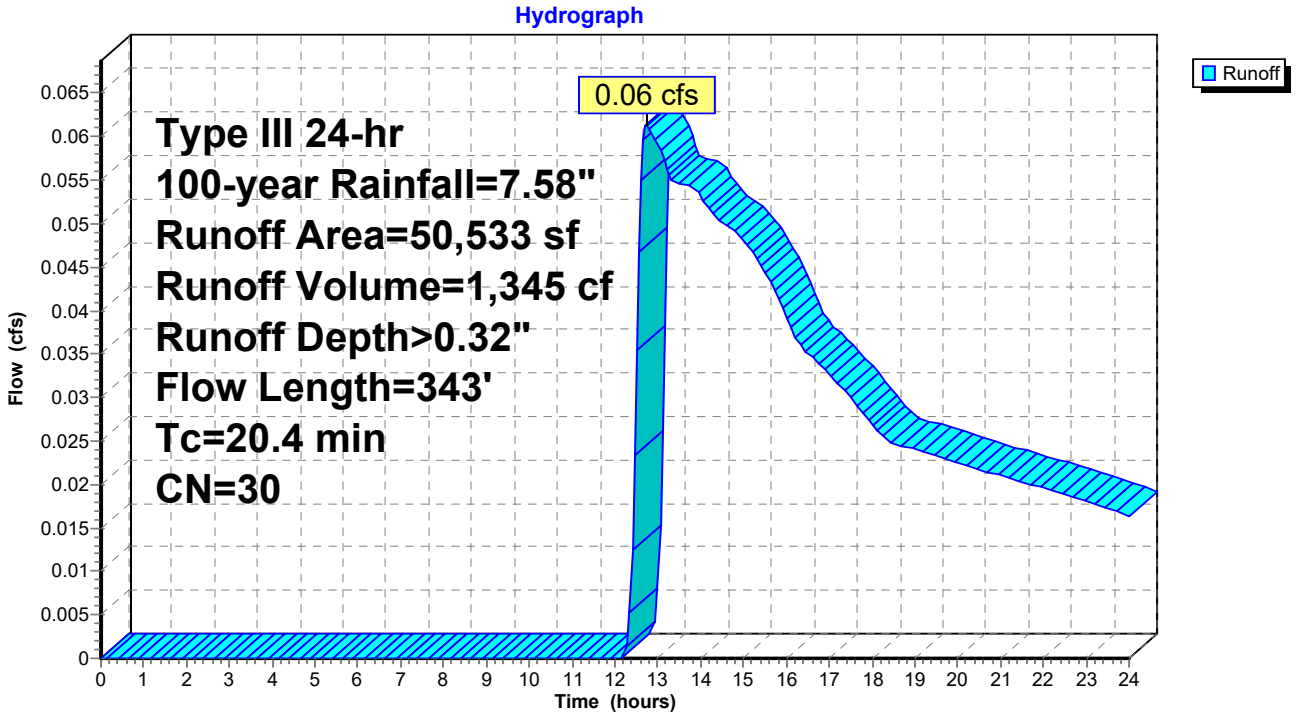
Runoff = 0.06 cfs @ 12.73 hrs, Volume= 1,345 cf, Depth> 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.58"

Area (sf)	CN	Description
50,533	30	Woods, Good, HSG A
50,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
4.7	293	0.0440	1.05		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.4	343	Total			

Subcatchment 1X: Eastern Portion of Site



Summary for Subcatchment 2X: Western Portion of Site

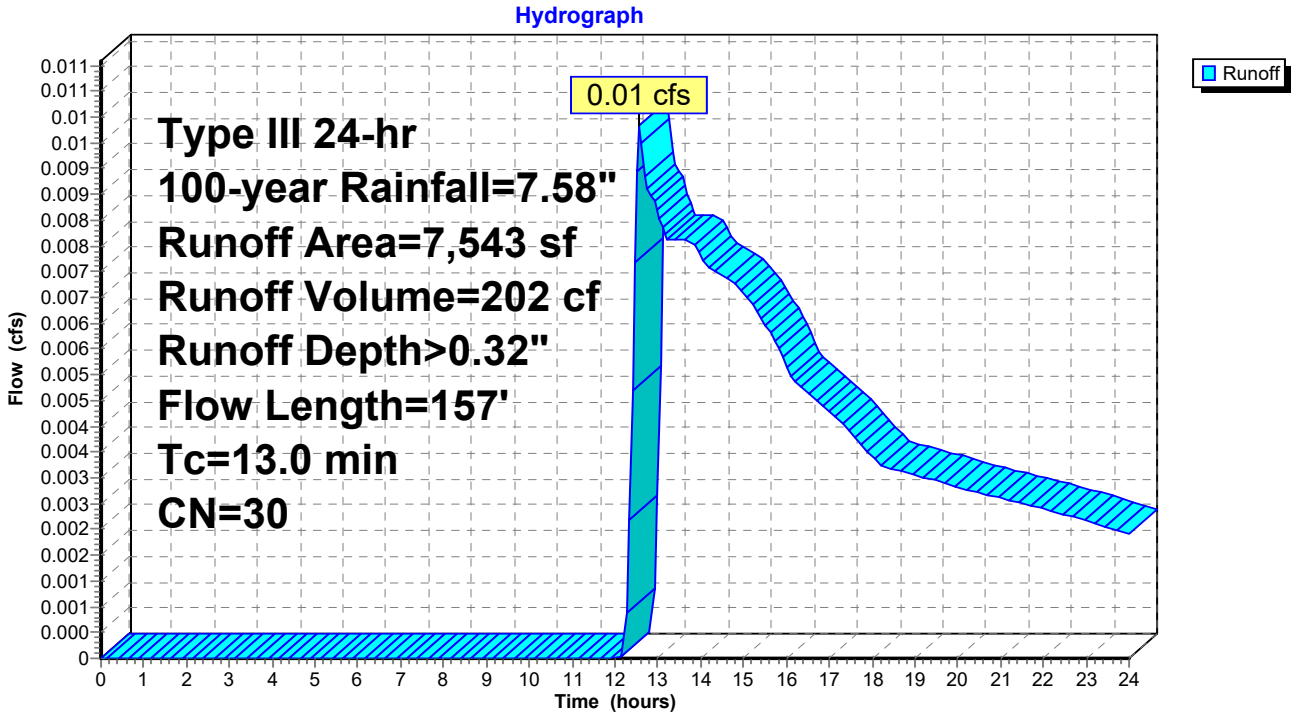
Runoff = 0.01 cfs @ 12.57 hrs, Volume= 202 cf, Depth> 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.58"

Area (sf)	CN	Description
7,543	30	Woods, Good, HSG A
7,543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	107	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.0	157	Total			

Subcatchment 2X: Western Portion of Site



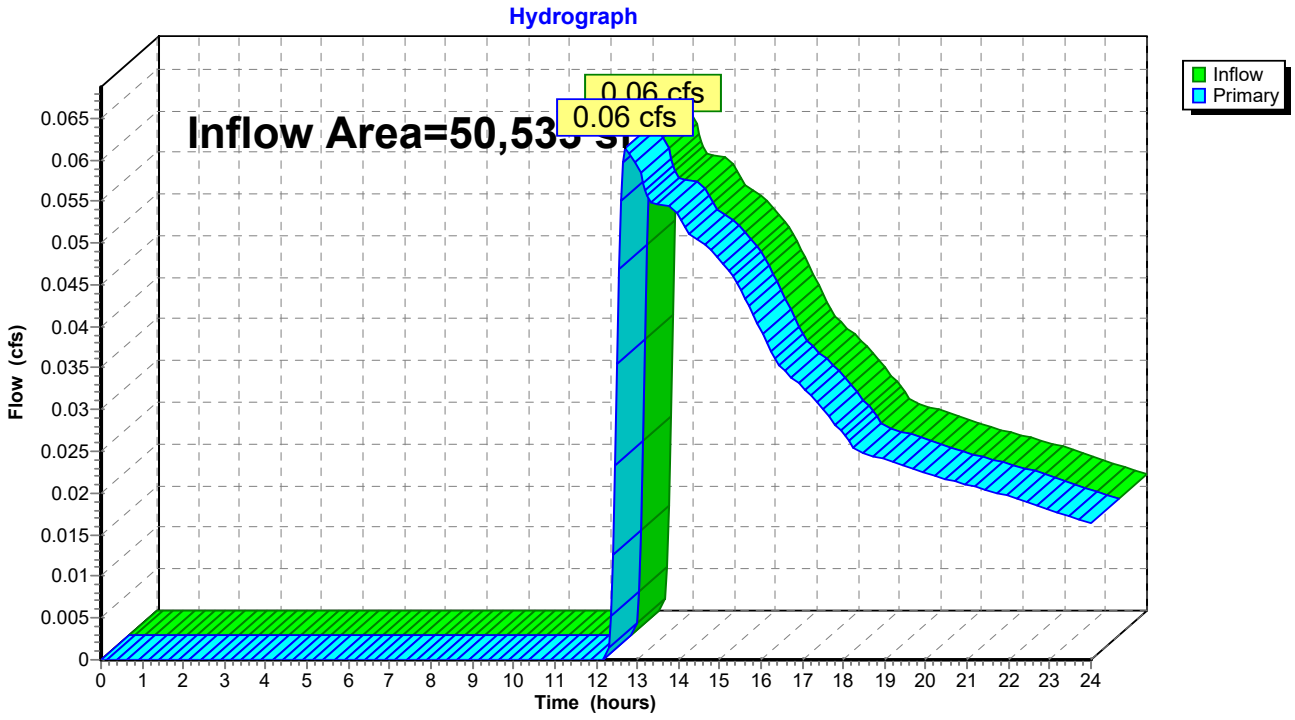
Summary for Pond SUM1: Sum Point - South East

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

Inflow Area = 50,533 sf, 0.00% Impervious, Inflow Depth > 0.32" for 100-year event
Inflow = 0.06 cfs @ 12.73 hrs, Volume= 1,345 cf
Primary = 0.06 cfs @ 12.73 hrs, Volume= 1,345 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM1: Sum Point - South East



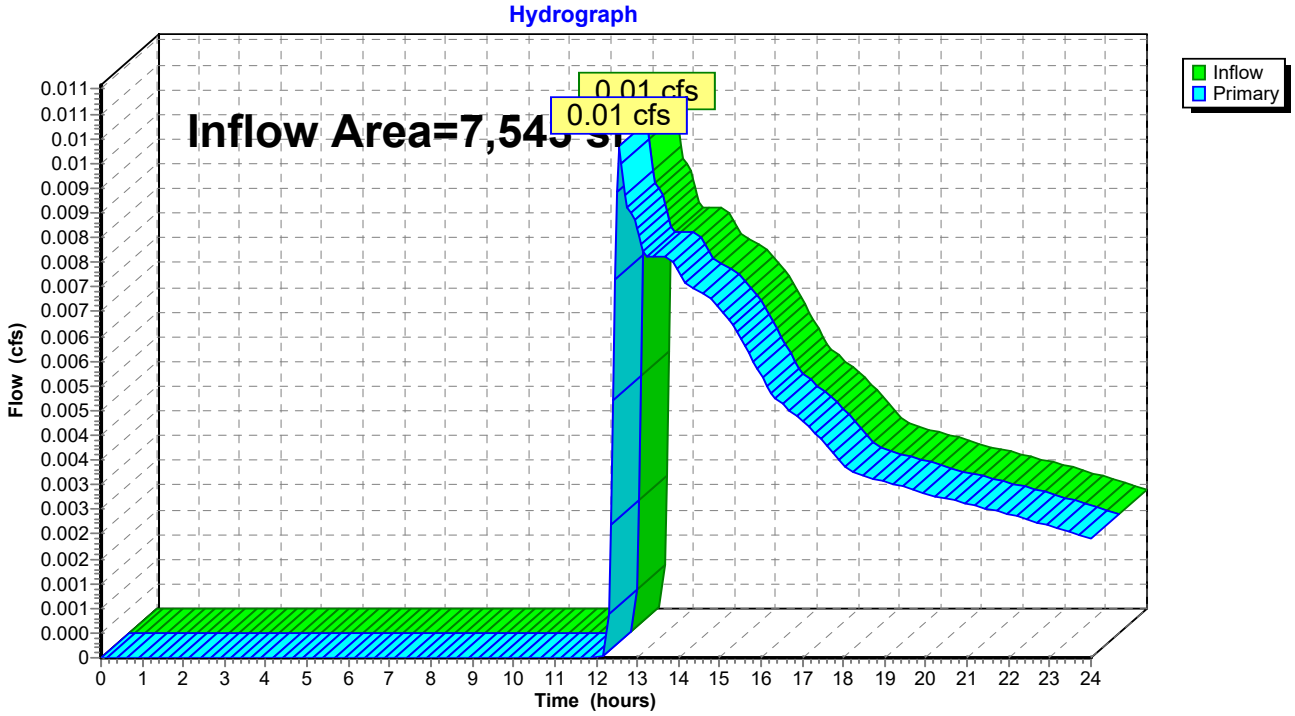
Summary for Pond SUM2: Sum Point - North

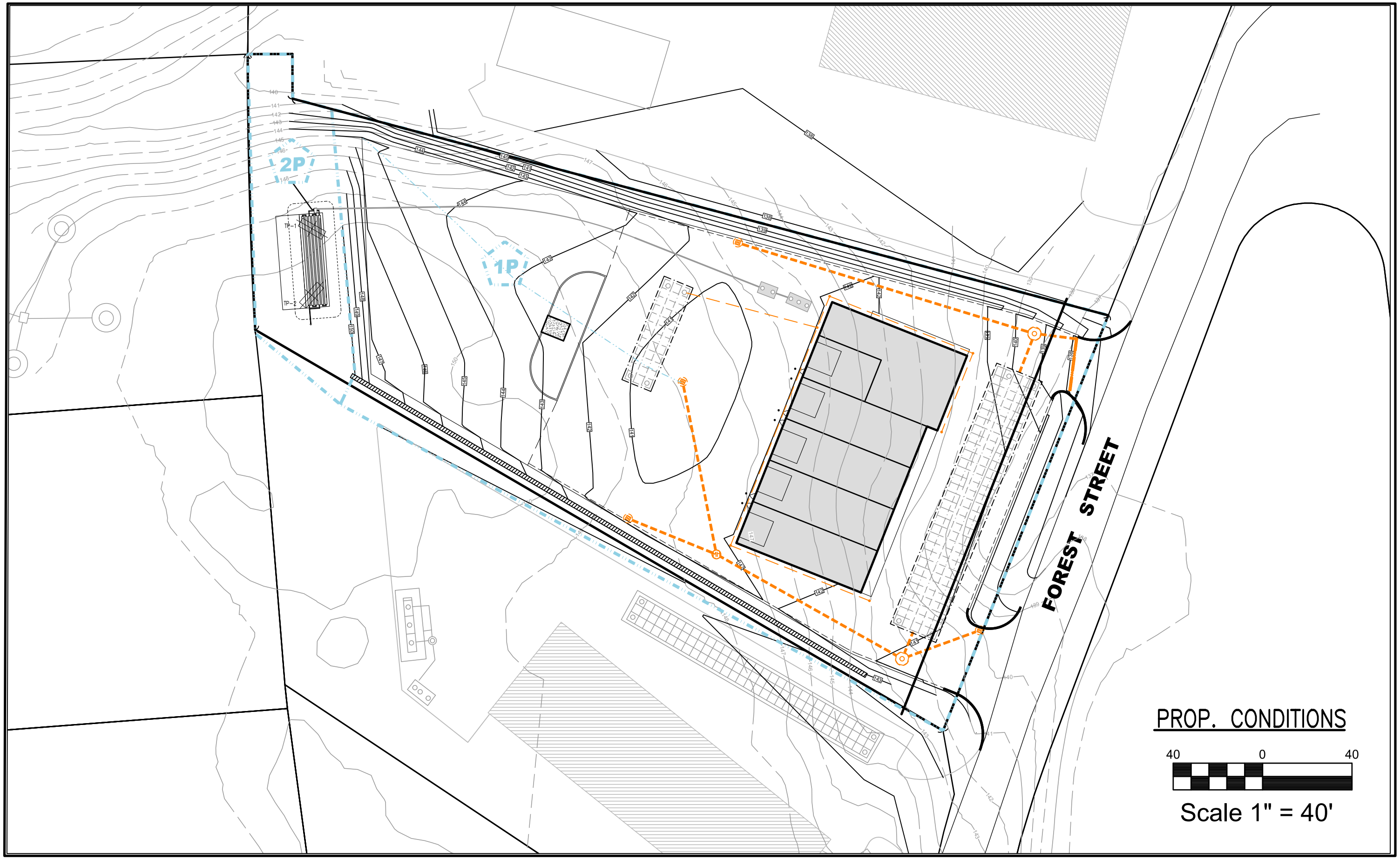
[40] Hint: Not Described (Outflow=Inflow)

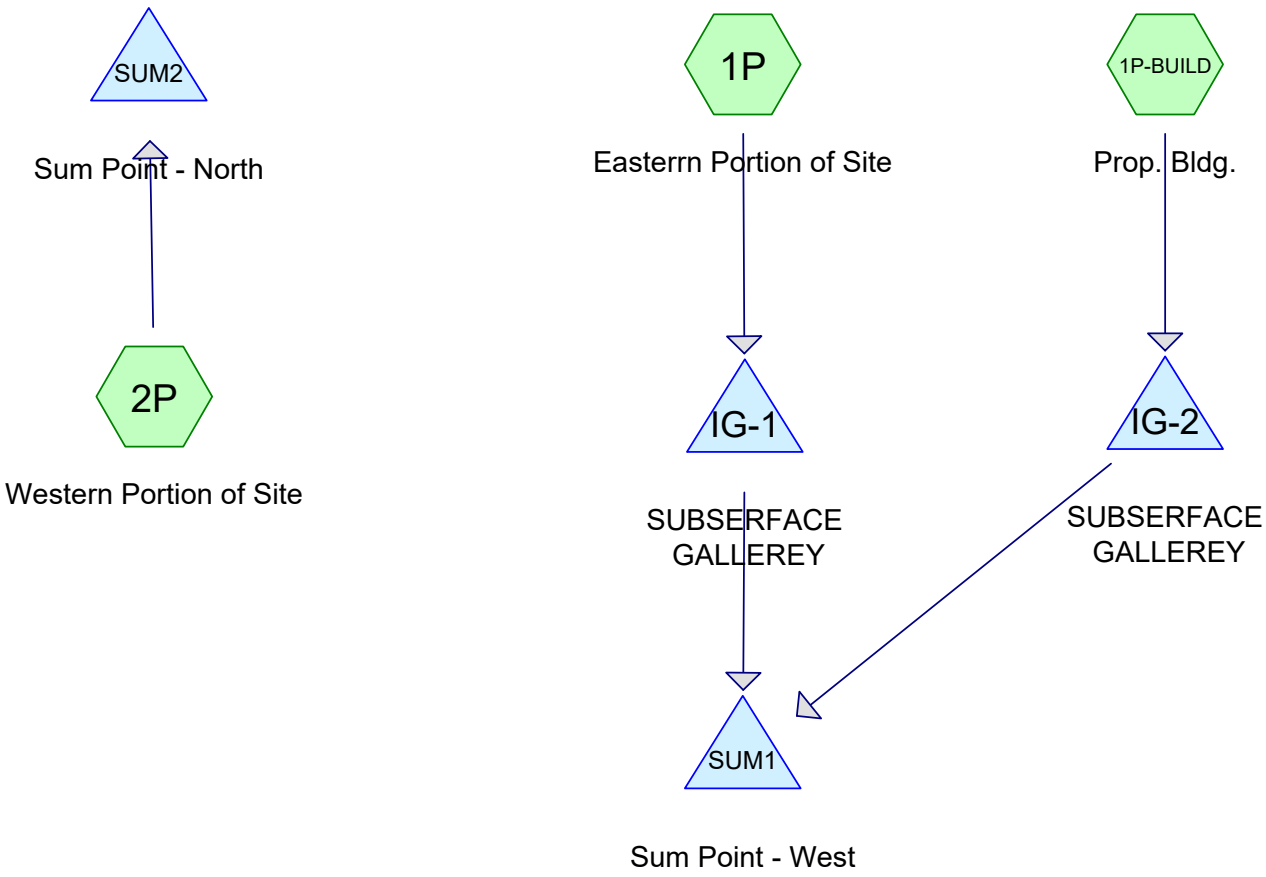
Inflow Area = 7,543 sf, 0.00% Impervious, Inflow Depth > 0.32" for 100-year event
Inflow = 0.01 cfs @ 12.57 hrs, Volume= 202 cf
Primary = 0.01 cfs @ 12.57 hrs, Volume= 202 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM2: Sum Point - North




2P
1P
TP-1
TP-2
FOREST STREET
PROP. CONDITIONS
40
0
40
Scale 1" = 40'



Subcat Reach Pond Link

Routing Diagram for 2022.05.31 - Priolo - Forest St - Prop Cond
Prepared by {enter your company name here}, Printed 6/9/2022
HydroCAD® 10.00-24 s/n 10807 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
11,009	76	Gravel roads, HSG A (1P)
24,772	98	Paved parking, HSG A (1P)
7,140	98	Roofs, HSG A (1P-BUILD)
5,281	30	Woods, Good, HSG A (2P)
9,874	32	Woods/grass comb., Good, HSG A (1P)
58,076	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
58,076	HSG A	1P, 1P-BUILD, 2P
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
58,076		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
11,009	0	0	0	0	11,009	Gravel roads	
24,772	0	0	0	0	24,772	Paved parking	
7,140	0	0	0	0	7,140	Roofs	
5,281	0	0	0	0	5,281	Woods, Good	
9,874	0	0	0	0	9,874	Woods/grass comb., Good	
58,076	**0**	**0**	**0**	**0**	**58,076**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: Easterrn Portion of Site Runoff Area=45,655 sf 54.26% Impervious Runoff Depth>2.08"
Flow Length=180' Slope=0.0200 '/' Tc=6.0 min CN=WQ Runoff=2.25 cfs 7,909 cf

Subcatchment 1P-BUILD: Prop. Bldg. Runoff Area=7,140 sf 100.00% Impervious Runoff Depth>3.23"
Tc=6.0 min CN=WQ Runoff=0.54 cfs 1,925 cf

Subcatchment 2P: Western Portion of Site Runoff Area=5,281 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=157' Tc=13.1 min CN=30 Runoff=0.00 cfs 0 cf

Pond IG-1: SUBSERFACE GALLEREY Peak Elev=130.64' Storage=0.033 af Inflow=2.25 cfs 7,909 cf
Discarded=0.64 cfs 7,905 cf Primary=0.00 cfs 0 cf Outflow=0.64 cfs 7,905 cf

Pond IG-2: SUBSERFACE GALLEREY Peak Elev=130.48' Storage=392 cf Inflow=0.54 cfs 1,925 cf
Discarded=0.13 cfs 1,924 cf Primary=0.00 cfs 0 cf Outflow=0.13 cfs 1,924 cf

Pond SUM1: Sum Point - West Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond SUM2: Sum Point - North Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 58,076 sf Runoff Volume = 9,833 cf Average Runoff Depth = 2.03"
45.05% Pervious = 26,164 sf 54.95% Impervious = 31,912 sf

Summary for Subcatchment 1P: Easterrn Portion of Site

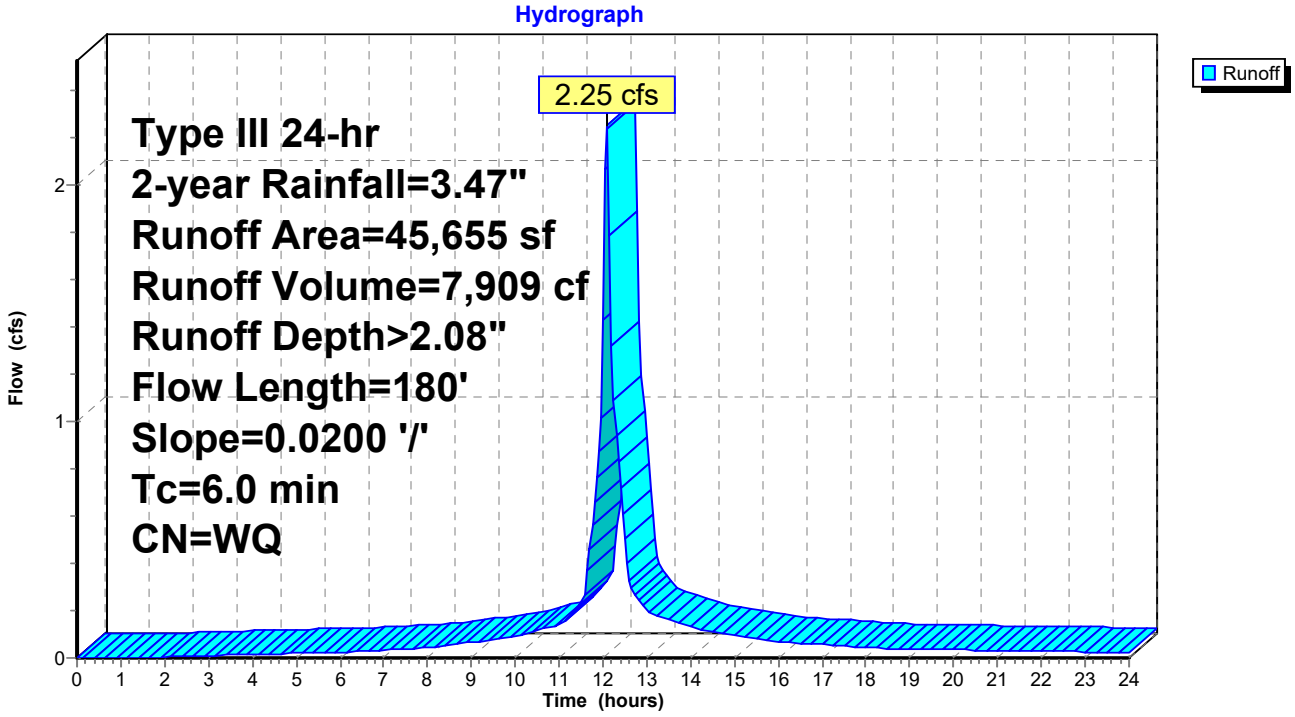
Runoff = 2.25 cfs @ 12.09 hrs, Volume= 7,909 cf, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.47"

Area (sf)	CN	Description
24,772	98	Paved parking, HSG A
9,874	32	Woods/grass comb., Good, HSG A
11,009	76	Gravel roads, HSG A
45,655		Weighted Average
20,883		45.74% Pervious Area
24,772		54.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	130	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	50	0.0200	1.23		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
4.5					**Direct Entry, MIN, Tc**
6.0	180	Total			

Subcatchment 1P: Easterrn Portion of Site



Summary for Subcatchment 1P-BUILD: Prop. Bldg.

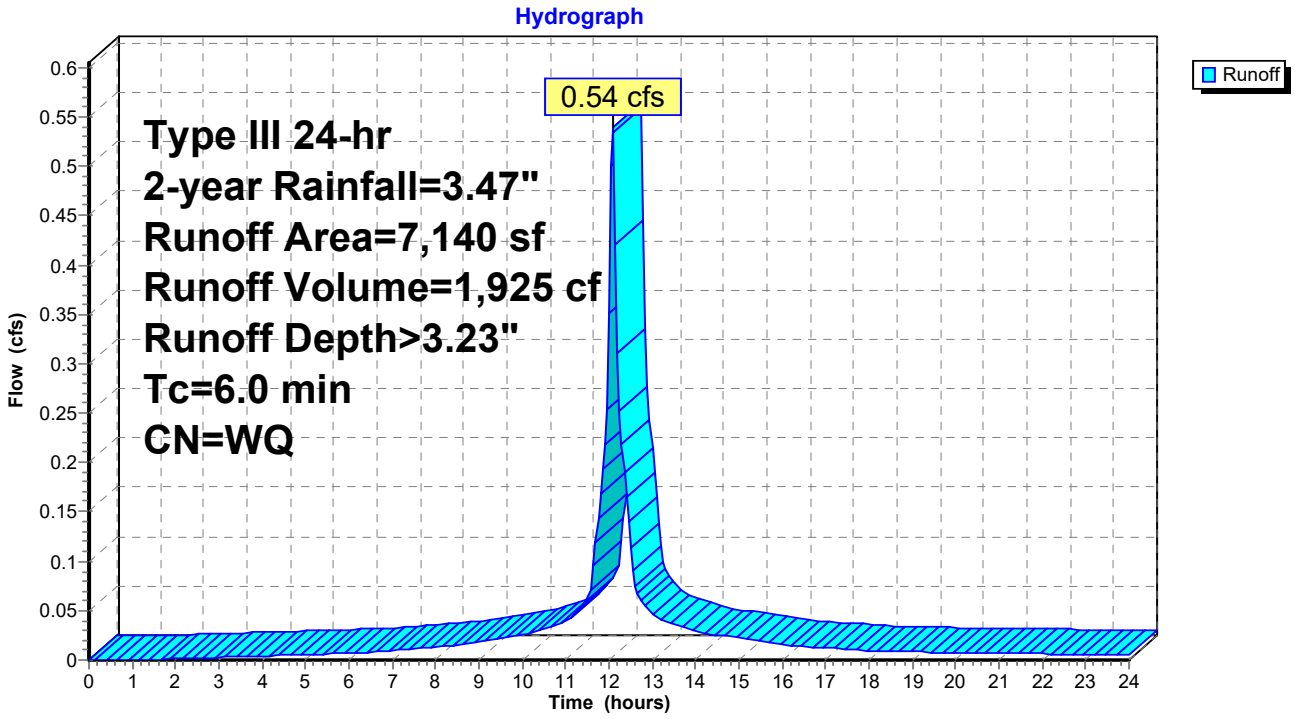
Runoff = 0.54 cfs @ 12.09 hrs, Volume= 1,925 cf, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.47"

Area (sf)	CN	Description
7,140	98	Roofs, HSG A
0	76	Gravel roads, HSG A
7,140		Weighted Average
7,140		100.00% Impervious Area

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

Subcatchment 1P-BUILD: Prop. Bldg.



Summary for Subcatchment 2P: Western Portion of Site

[45] Hint: Runoff=Zero

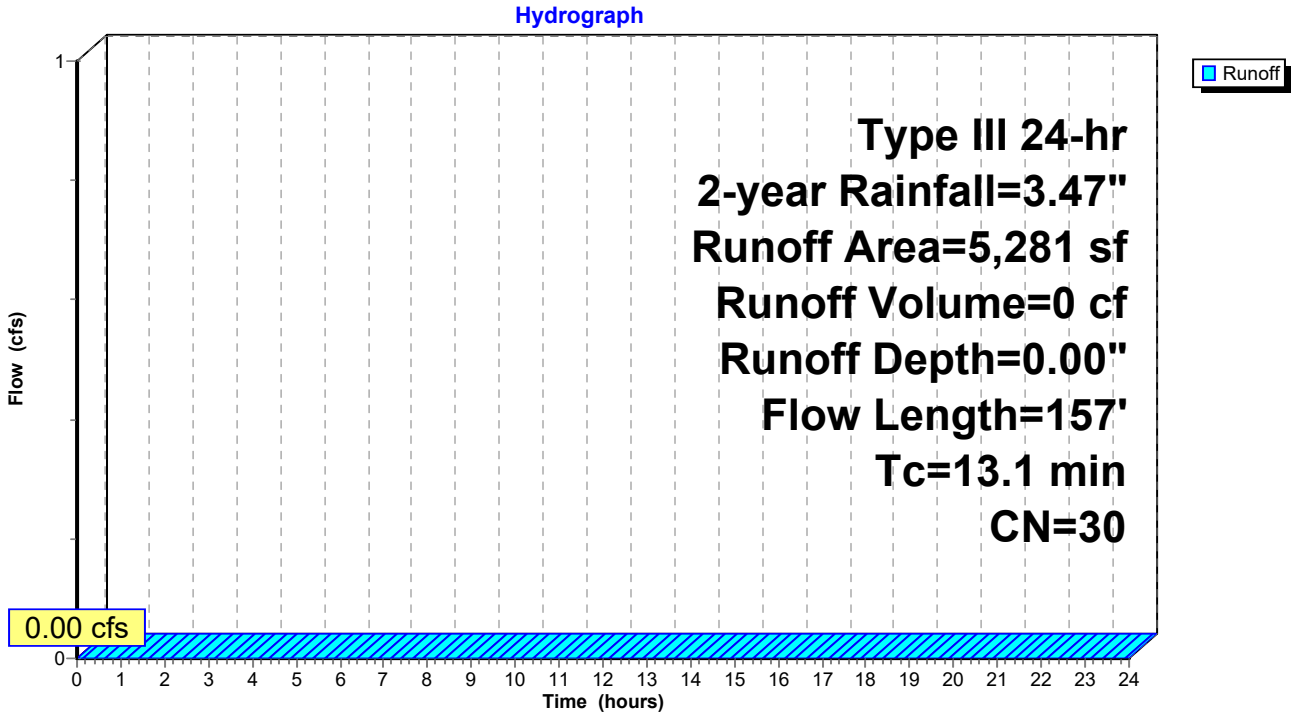
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.47"

Area (sf)	CN	Description
5,281	30	Woods, Good, HSG A
5,281		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	107	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	157	Total			

Subcatchment 2P: Western Portion of Site



Summary for Pond IG-1: SUBSERFACE GALLEREY

Inflow Area = 45,655 sf, 54.26% Impervious, Inflow Depth > 2.08" for 2-year event
Inflow = 2.25 cfs @ 12.09 hrs, Volume= 7,909 cf
Outflow = 0.64 cfs @ 11.85 hrs, Volume= 7,905 cf, Atten= 72%, Lag= 0.0 min
Discarded = 0.64 cfs @ 11.85 hrs, Volume= 7,905 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.64' @ 12.43 hrs Surf.Area= 0.064 ac Storage= 0.033 af

Plug-Flow detention time= 11.3 min calculated for 7,905 cf (100% of inflow)
Center-of-Mass det. time= 11.0 min (780.3 - 769.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.50'	0.053 af	**22.00'W x 126.00'L x 4.50'H Field A** 0.286 af Overall - 0.154 af Embedded = 0.133 af x 40.0% Voids
#2A	130.50'	0.111 af	**Concrete Galley 4x4x3** x 155 Inside #1 Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf 155 Chambers in 5 Rows
#3	133.20'	0.001 af	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		0.165 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.20'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	129.50'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.64 cfs @ 11.85 hrs HW=129.60' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.64 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.50' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Pond IG-1: SUBSERFACE GALLEREY - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x3 (Concrete Galley, Shea LE-EGLPH, LE-CGLPH or equivalent)
Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf
Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf

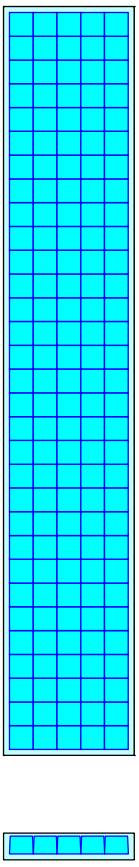
31 Chambers/Row x 4.00' Long = 124.00' Row Length +12.0" End Stone x 2 = 126.00' Base Length
5 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 22.00' Base Width
12.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.50' Field Height

155 Chambers x 31.2 cf = 4,834.7 cf Chamber Storage
155 Chambers x 43.2 cf = 6,701.5 cf Displacement

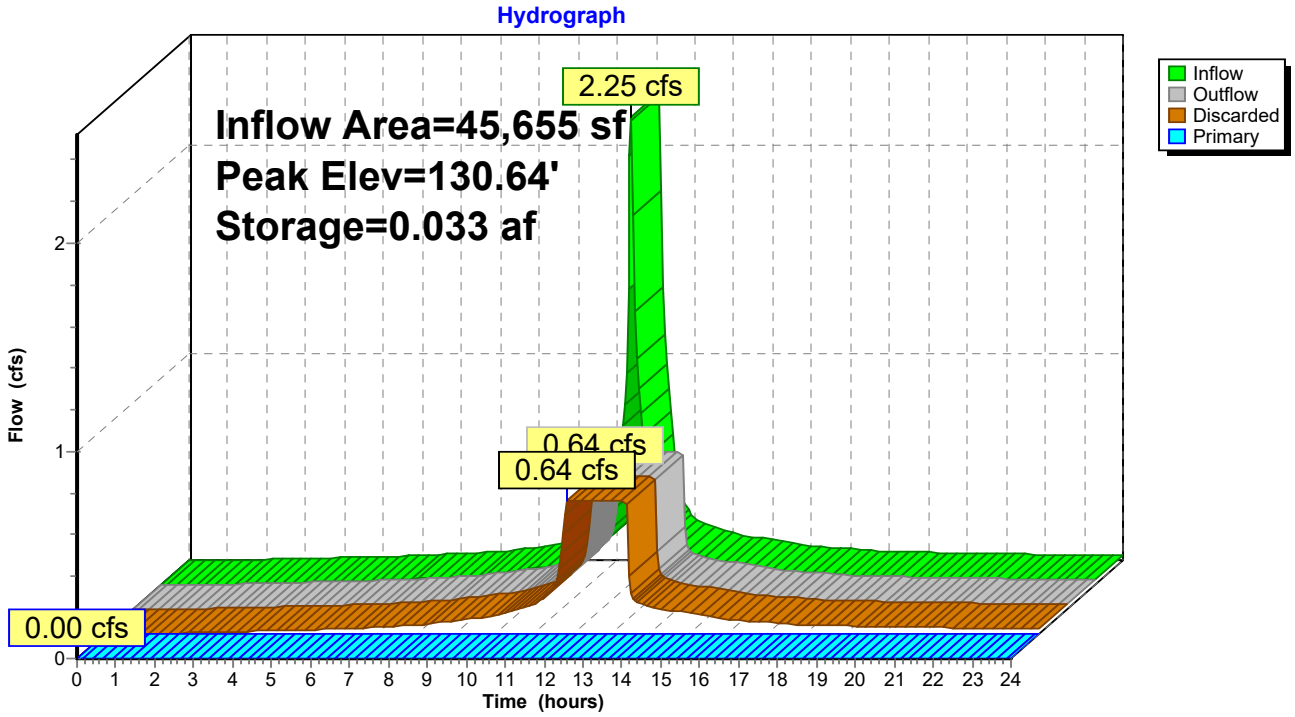
12,474.0 cf Field - 6,701.5 cf Chambers = 5,772.5 cf Stone x 40.0% Voids = 2,309.0 cf Stone Storage

Chamber Storage + Stone Storage = 7,143.7 cf = 0.164 af
Overall Storage Efficiency = 57.3%
Overall System Size = 126.00' x 22.00' x 4.50'

155 Chambers
462.0 cy Field
213.8 cy Stone



Pond IG-1: SUBSERFACE GALLEREY



Summary for Pond IG-2: SUBSERFACE GALLEREY

Inflow Area = 7,140 sf,100.00% Impervious, Inflow Depth > 3.23" for 2-year event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,925 cf
Outflow = 0.13 cfs @ 11.80 hrs, Volume= 1,924 cf, Atten= 75%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.80 hrs, Volume= 1,924 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.48' @ 12.46 hrs Surf.Area= 700 sf Storage= 392 cf

Plug-Flow detention time= 15.3 min calculated for 1,924 cf (100% of inflow)
Center-of-Mass det. time= 15.0 min (769.3 - 754.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.50'	427 cf	**14.00'W x 50.00'L x 3.75'H Field A** 2,625 cf Overall - 1,556 cf Embedded = 1,069 cf x 40.0% Voids
#2A	130.00'	1,123 cf	**Concrete Galley 4x4x3** x 36 Inside #1 Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf 36 Chambers in 3 Rows
#3	133.20'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		1,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.20'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	129.50'	**8.240 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.80 hrs HW=129.60' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.50' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Pond IG-2: SUBSERFACE GALLEREY - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x3 (Concrete Galley, Shea LE-EGLPH, LE-CGLPH or equivalent)
Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf
Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf

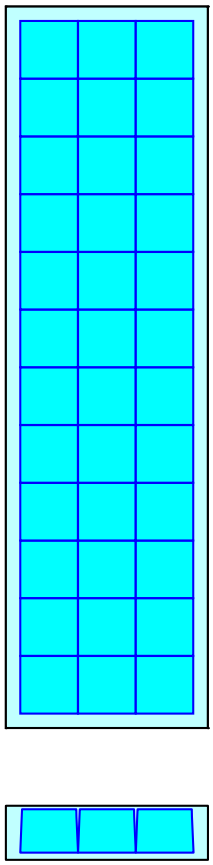
12 Chambers/Row x 4.00' Long = 48.00' Row Length +12.0" End Stone x 2 = 50.00' Base Length
3 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 14.00' Base Width
6.0" Base + 36.0" Chamber Height + 3.0" Cover = 3.75' Field Height

36 Chambers x 31.2 cf = 1,122.9 cf Chamber Storage
36 Chambers x 43.2 cf = 1,556.5 cf Displacement

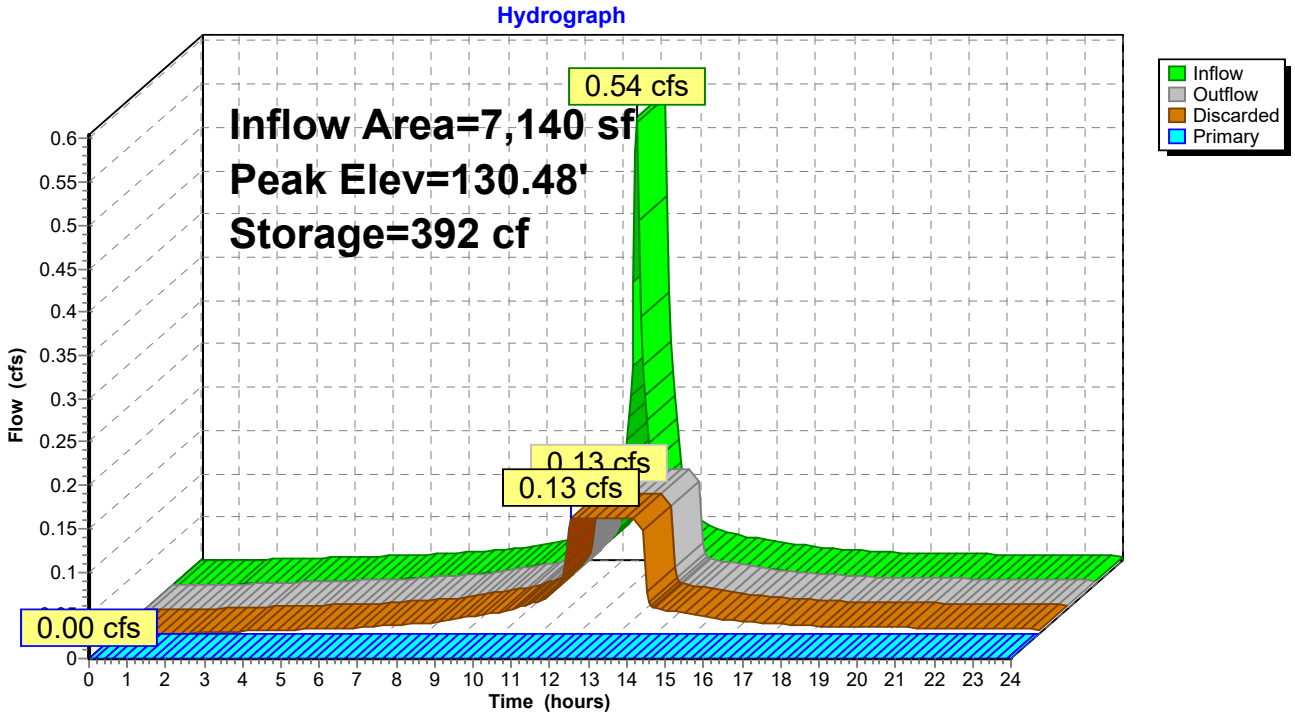
2,625.0 cf Field - 1,556.5 cf Chambers = 1,068.5 cf Stone x 40.0% Voids = 427.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,550.3 cf = 0.036 af
Overall Storage Efficiency = 59.1%
Overall System Size = 50.00' x 14.00' x 3.75'

36 Chambers
97.2 cy Field
39.6 cy Stone



Pond IG-2: SUBSERFACE GALLEREY



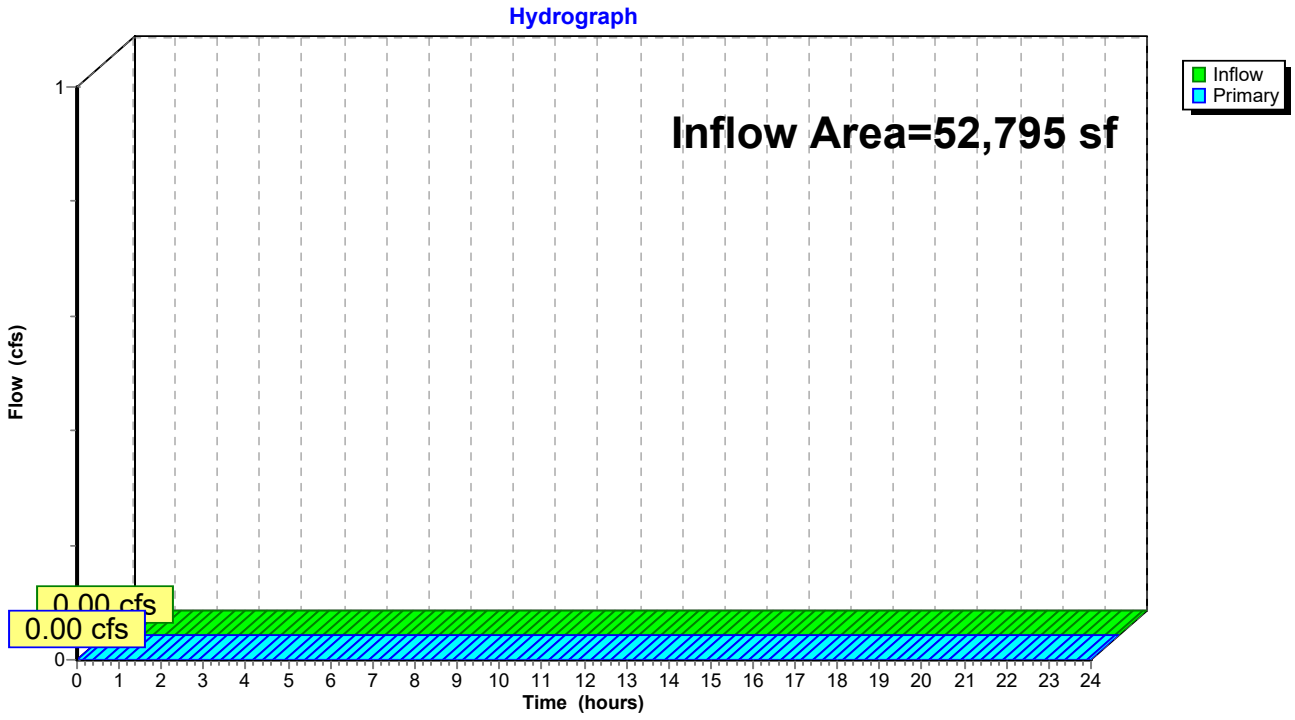
Summary for Pond SUM1: Sum Point - West

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

Inflow Area = 52,795 sf, 60.45% Impervious, Inflow Depth = 0.00" for 2-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM1: Sum Point - West



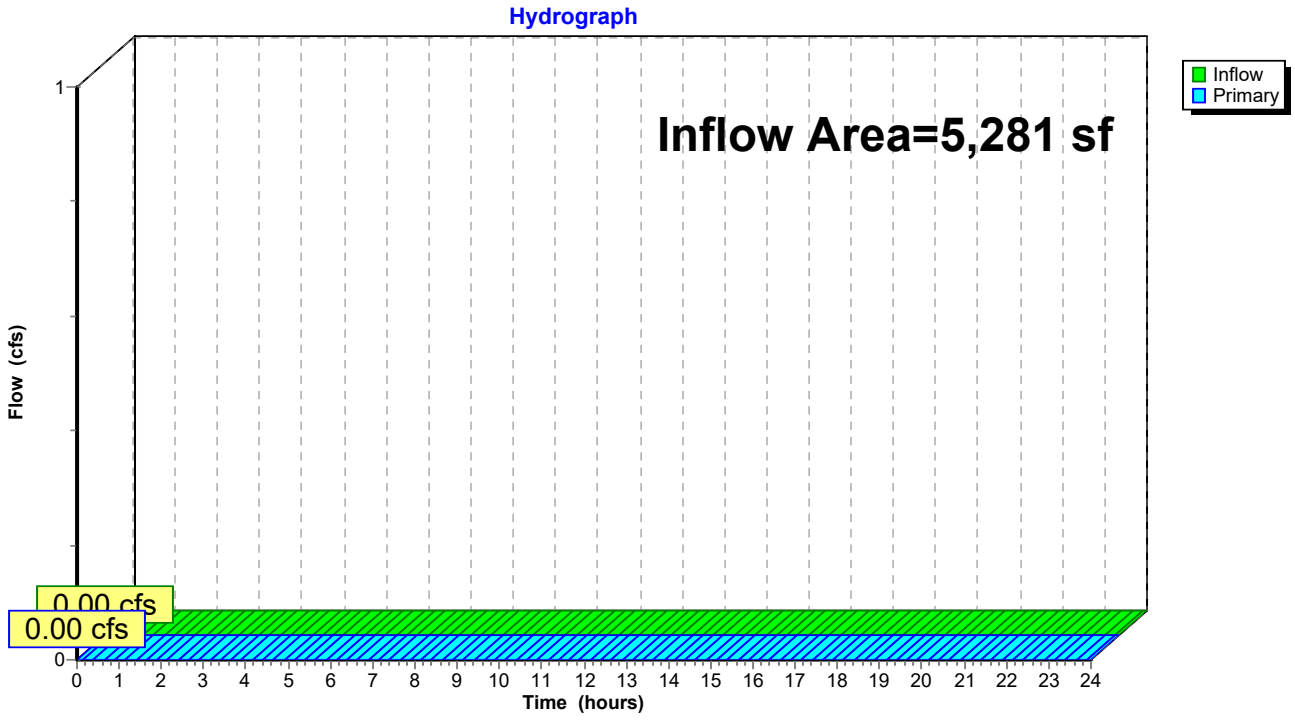
Summary for Pond SUM2: Sum Point - North

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

Inflow Area = 5,281 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM2: Sum Point - North



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: Easterrn Portion of Site Runoff Area=45,655 sf 54.26% Impervious Runoff Depth>3.38"
Flow Length=180' Slope=0.0200 '/' Tc=6.0 min CN=WQ Runoff=3.64 cfs 12,864 cf

Subcatchment 1P-BUILD: Prop. Bldg. Runoff Area=7,140 sf 100.00% Impervious Runoff Depth>5.00"
Tc=6.0 min CN=WQ Runoff=0.82 cfs 2,975 cf

Subcatchment 2P: Western Portion of Site Runoff Area=5,281 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=157' Tc=13.1 min CN=30 Runoff=0.00 cfs 6 cf

Pond IG-1: SUBSERFACE GALLEREY Peak Elev=131.52' Storage=0.076 af Inflow=3.64 cfs 12,864 cf
Discarded=0.64 cfs 12,858 cf Primary=0.00 cfs 0 cf Outflow=0.64 cfs 12,858 cf

Pond IG-2: SUBSERFACE GALLEREY Peak Elev=131.24' Storage=792 cf Inflow=0.82 cfs 2,975 cf
Discarded=0.13 cfs 2,974 cf Primary=0.00 cfs 0 cf Outflow=0.13 cfs 2,974 cf

Pond SUM1: Sum Point - West Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond SUM2: Sum Point - North Inflow=0.00 cfs 6 cf
Primary=0.00 cfs 6 cf

Total Runoff Area = 58,076 sf Runoff Volume = 15,844 cf Average Runoff Depth = 3.27"
45.05% Pervious = 26,164 sf 54.95% Impervious = 31,912 sf

Summary for Subcatchment 1P: Easterrn Portion of Site

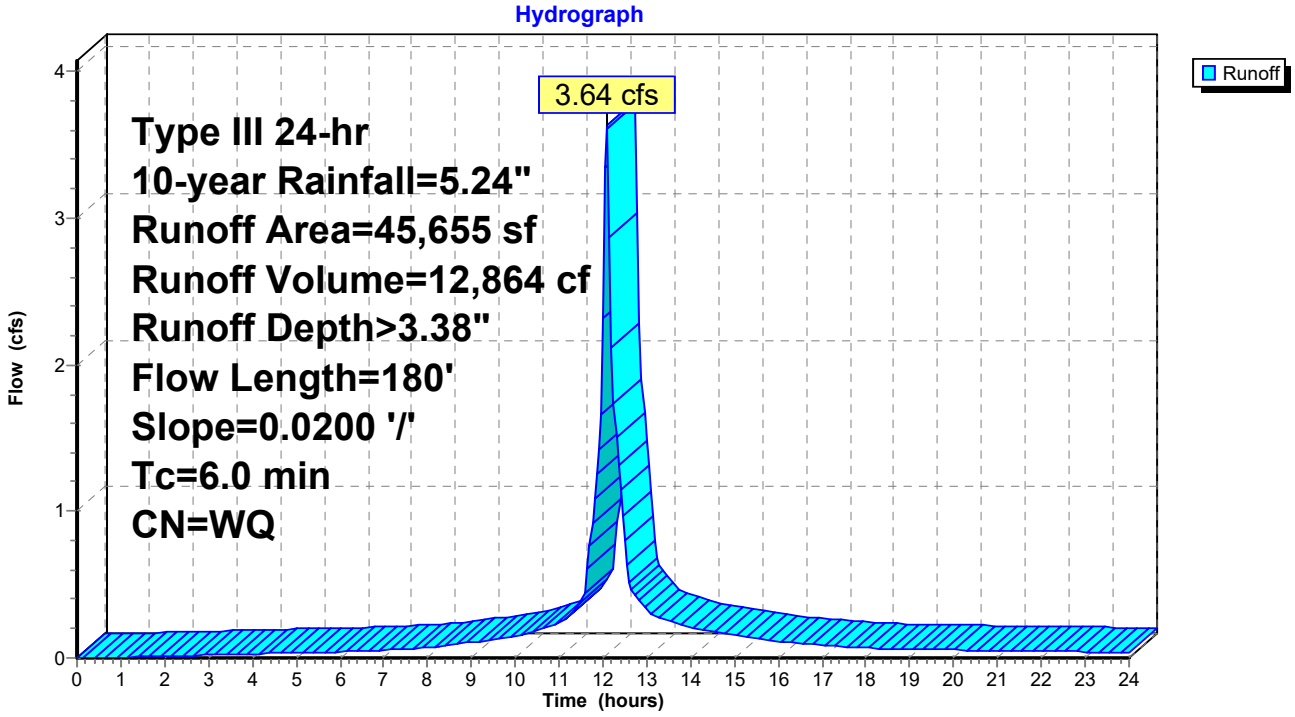
Runoff = 3.64 cfs @ 12.09 hrs, Volume= 12,864 cf, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.24"

Area (sf)	CN	Description
24,772	98	Paved parking, HSG A
9,874	32	Woods/grass comb., Good, HSG A
11,009	76	Gravel roads, HSG A
45,655		Weighted Average
20,883		45.74% Pervious Area
24,772		54.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	130	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	50	0.0200	1.23		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
4.5					**Direct Entry, MIN, Tc**
6.0	180	Total			

Subcatchment 1P: Easterrn Portion of Site



Summary for Subcatchment 1P-BUILD: Prop. Bldg.

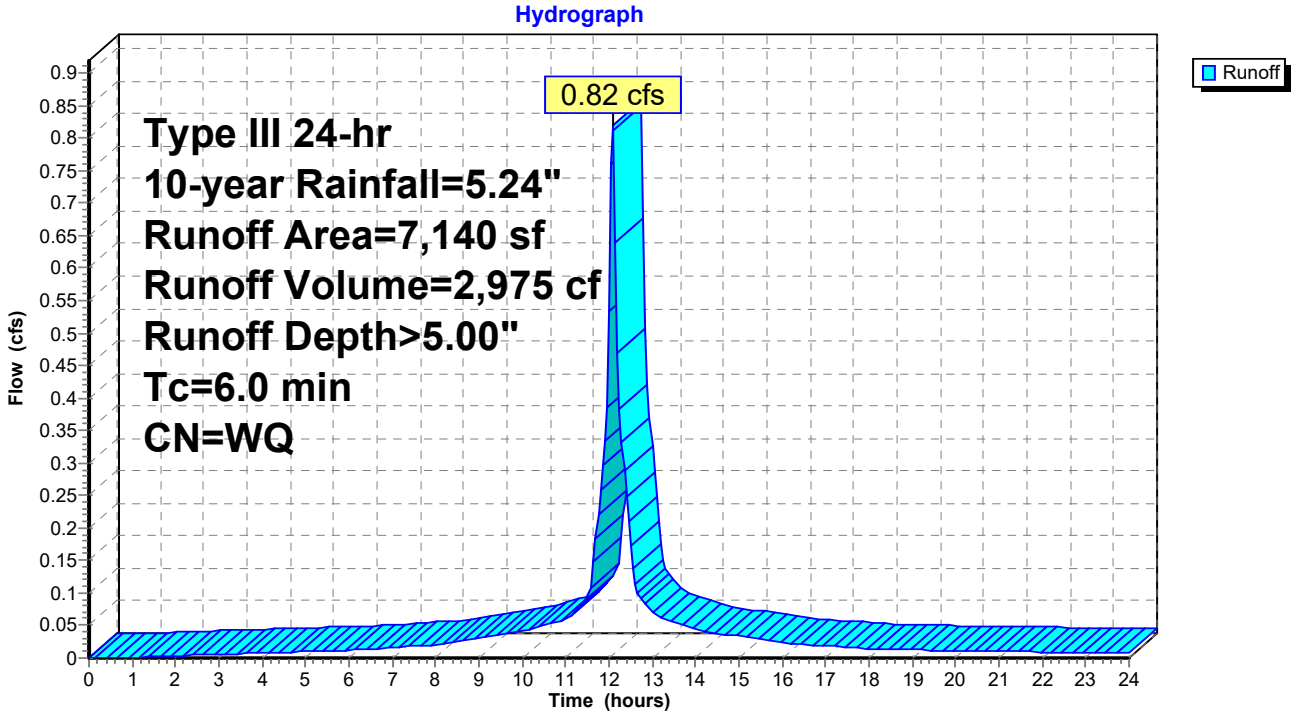
Runoff = 0.82 cfs @ 12.09 hrs, Volume= 2,975 cf, Depth> 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.24"

Area (sf)	CN	Description
7,140	98	Roofs, HSG A
0	76	Gravel roads, HSG A
7,140		Weighted Average
7,140		100.00% Impervious Area

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

Subcatchment 1P-BUILD: Prop. Bldg.



Summary for Subcatchment 2P: Western Portion of Site

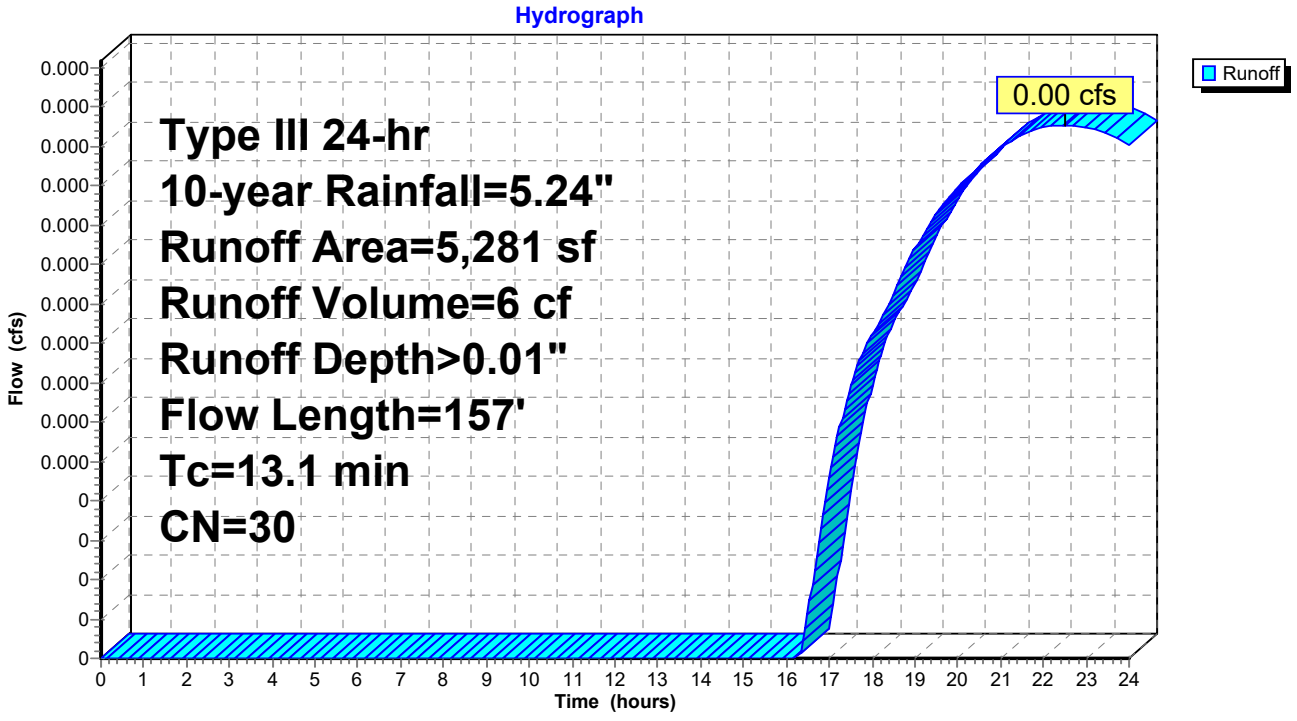
Runoff = 0.00 cfs @ 22.49 hrs, Volume= 6 cf, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.24"

Area (sf)	CN	Description
5,281	30	Woods, Good, HSG A
5,281		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	107	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	157	Total			

Subcatchment 2P: Western Portion of Site



Summary for Pond IG-1: SUBSERFACE GALLEREY

Inflow Area = 45,655 sf, 54.26% Impervious, Inflow Depth > 3.38" for 10-year event
Inflow = 3.64 cfs @ 12.09 hrs, Volume= 12,864 cf
Outflow = 0.64 cfs @ 11.70 hrs, Volume= 12,858 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.64 cfs @ 11.70 hrs, Volume= 12,858 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 131.52' @ 12.55 hrs Surf.Area= 0.064 ac Storage= 0.076 af

Plug-Flow detention time= 29.0 min calculated for 12,858 cf (100% of inflow)
Center-of-Mass det. time= 28.8 min (792.8 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.50'	0.053 af	**22.00'W x 126.00'L x 4.50'H Field A** 0.286 af Overall - 0.154 af Embedded = 0.133 af x 40.0% Voids
#2A	130.50'	0.111 af	**Concrete Galley 4x4x3** x 155 Inside #1 Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf 155 Chambers in 5 Rows
#3	133.20'	0.001 af	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		0.165 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.20'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	129.50'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.64 cfs @ 11.70 hrs HW=129.59' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.64 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.50' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Pond IG-1: SUBSERFACE GALLEREY - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x3 (Concrete Galley, Shea LE-EGLPH, LE-CGLPH or equivalent)
Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf
Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf

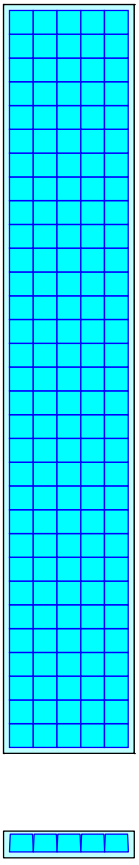
31 Chambers/Row x 4.00' Long = 124.00' Row Length +12.0" End Stone x 2 = 126.00' Base Length
5 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 22.00' Base Width
12.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.50' Field Height

155 Chambers x 31.2 cf = 4,834.7 cf Chamber Storage
155 Chambers x 43.2 cf = 6,701.5 cf Displacement

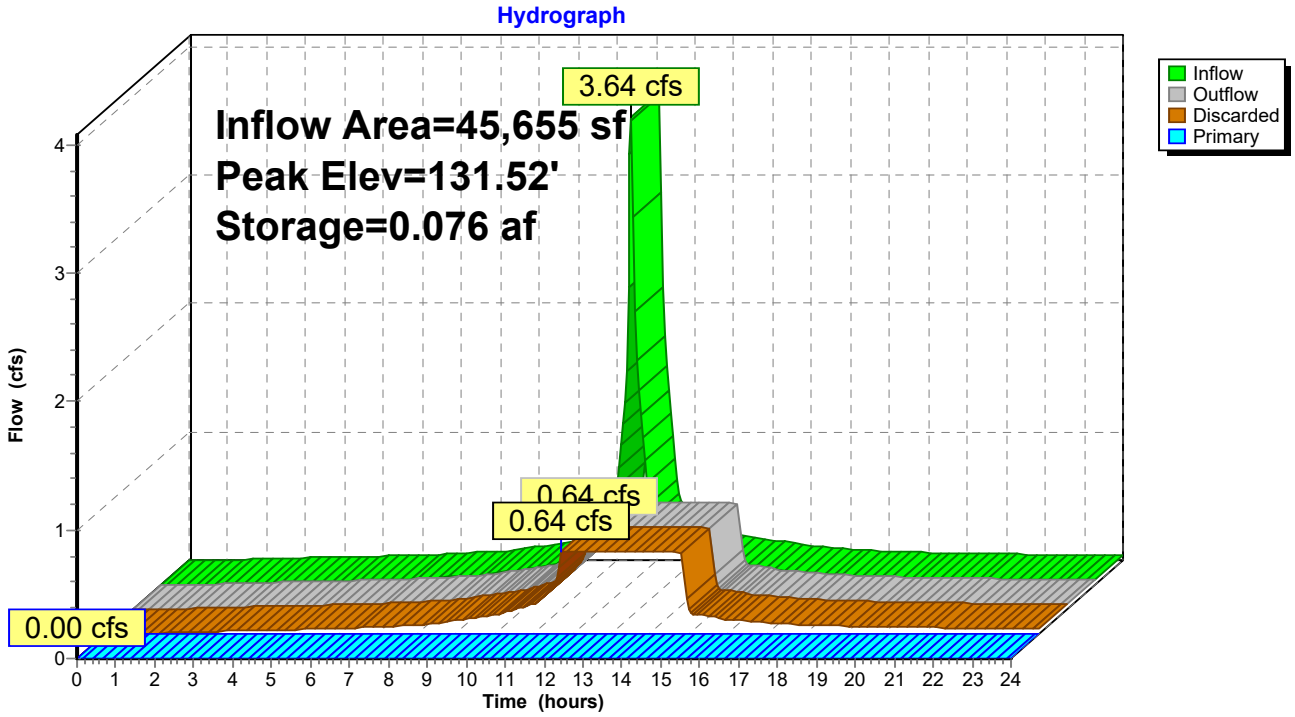
12,474.0 cf Field - 6,701.5 cf Chambers = 5,772.5 cf Stone x 40.0% Voids = 2,309.0 cf Stone Storage

Chamber Storage + Stone Storage = 7,143.7 cf = 0.164 af
Overall Storage Efficiency = 57.3%
Overall System Size = 126.00' x 22.00' x 4.50'

155 Chambers
462.0 cy Field
213.8 cy Stone



Pond IG-1: SUBSERFACE GALLEREY



Summary for Pond IG-2: SUBSERFACE GALLEREY

Inflow Area = 7,140 sf,100.00% Impervious, Inflow Depth > 5.00" for 10-year event
Inflow = 0.82 cfs @ 12.09 hrs, Volume= 2,975 cf
Outflow = 0.13 cfs @ 11.70 hrs, Volume= 2,974 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.70 hrs, Volume= 2,974 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 131.24' @ 12.56 hrs Surf.Area= 700 sf Storage= 792 cf

Plug-Flow detention time= 33.4 min calculated for 2,974 cf (100% of inflow)
Center-of-Mass det. time= 33.1 min (779.9 - 746.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.50'	427 cf	**14.00'W x 50.00'L x 3.75'H Field A** 2,625 cf Overall - 1,556 cf Embedded = 1,069 cf x 40.0% Voids
#2A	130.00'	1,123 cf	**Concrete Galley 4x4x3** x 36 Inside #1 Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf 36 Chambers in 3 Rows
#3	133.20'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		1,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.20'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	129.50'	**8.240 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.70 hrs HW=129.60' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.50' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Pond IG-2: SUBSERFACE GALLEREY - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x3 (Concrete Galley, Shea LE-EGLPH, LE-CGLPH or equivalent)
Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf
Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf

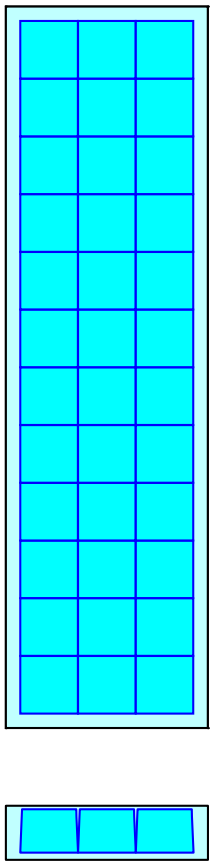
12 Chambers/Row x 4.00' Long = 48.00' Row Length +12.0" End Stone x 2 = 50.00' Base Length
3 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 14.00' Base Width
6.0" Base + 36.0" Chamber Height + 3.0" Cover = 3.75' Field Height

36 Chambers x 31.2 cf = 1,122.9 cf Chamber Storage
36 Chambers x 43.2 cf = 1,556.5 cf Displacement

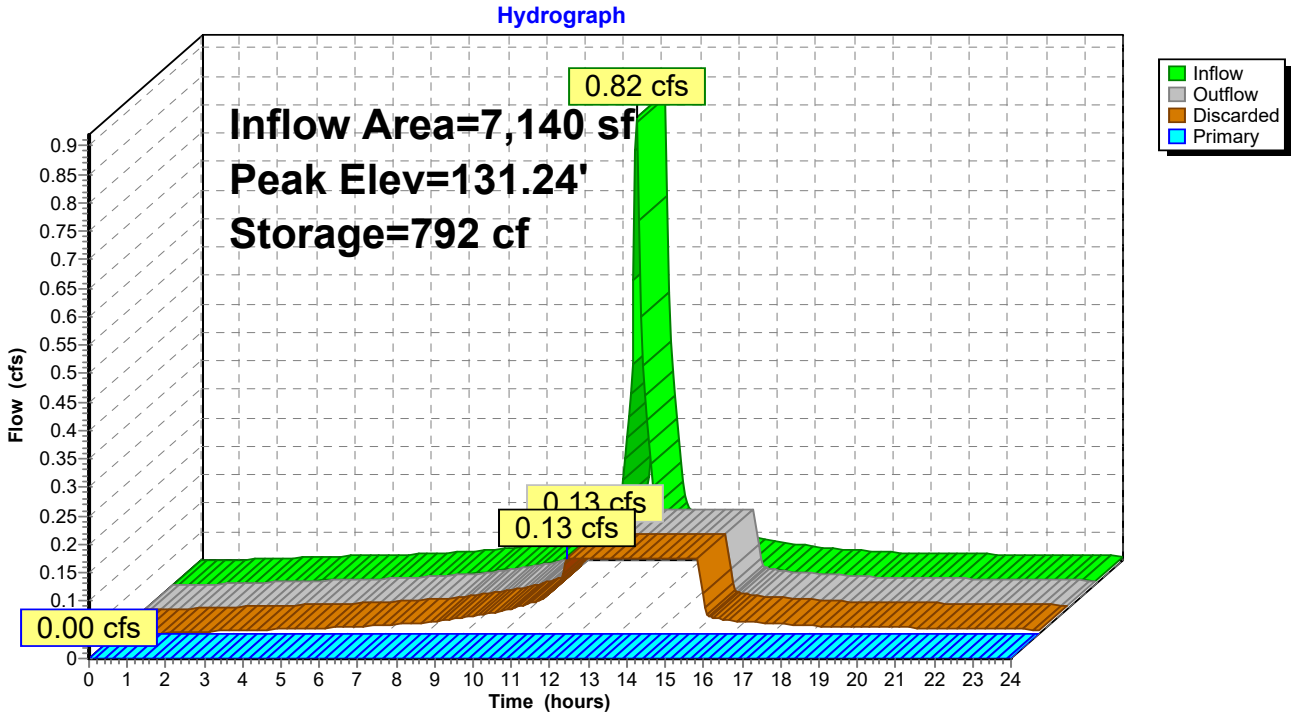
2,625.0 cf Field - 1,556.5 cf Chambers = 1,068.5 cf Stone x 40.0% Voids = 427.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,550.3 cf = 0.036 af
Overall Storage Efficiency = 59.1%
Overall System Size = 50.00' x 14.00' x 3.75'

36 Chambers
97.2 cy Field
39.6 cy Stone



Pond IG-2: SUBSERFACE GALLEREY



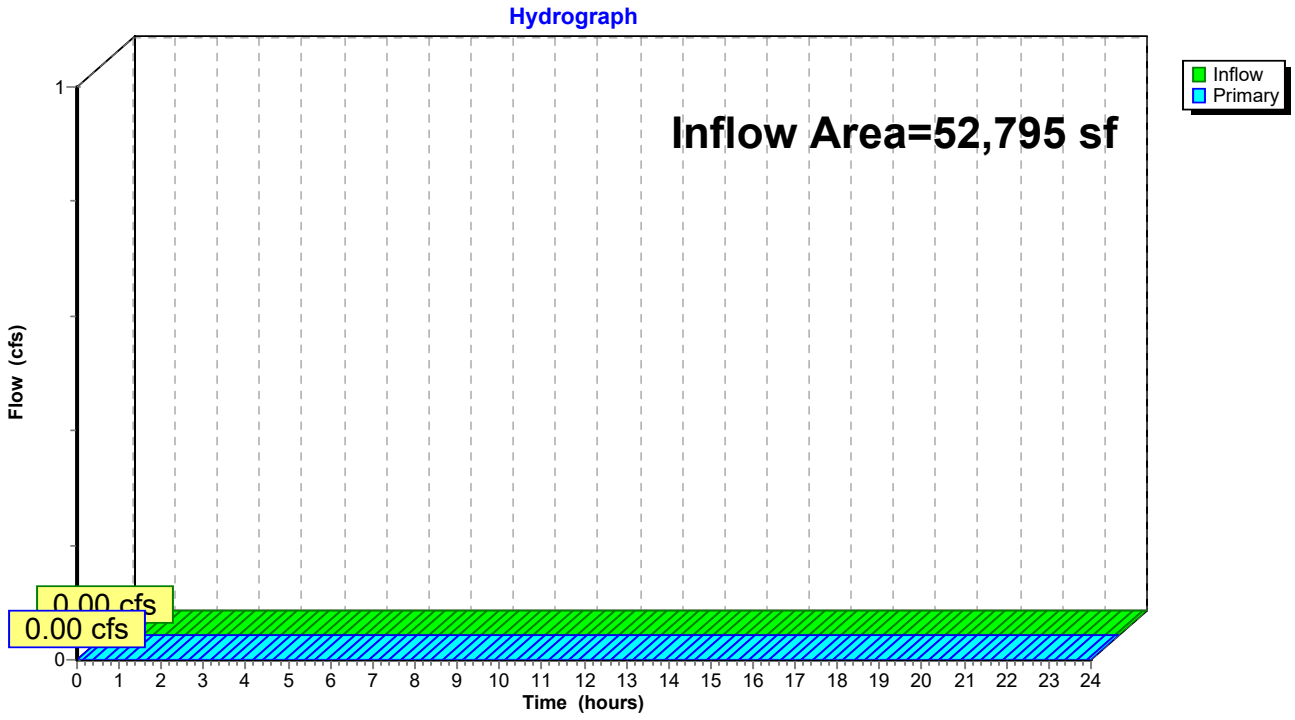
Summary for Pond SUM1: Sum Point - West

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

Inflow Area = 52,795 sf, 60.45% Impervious, Inflow Depth = 0.00" for 10-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM1: Sum Point - West



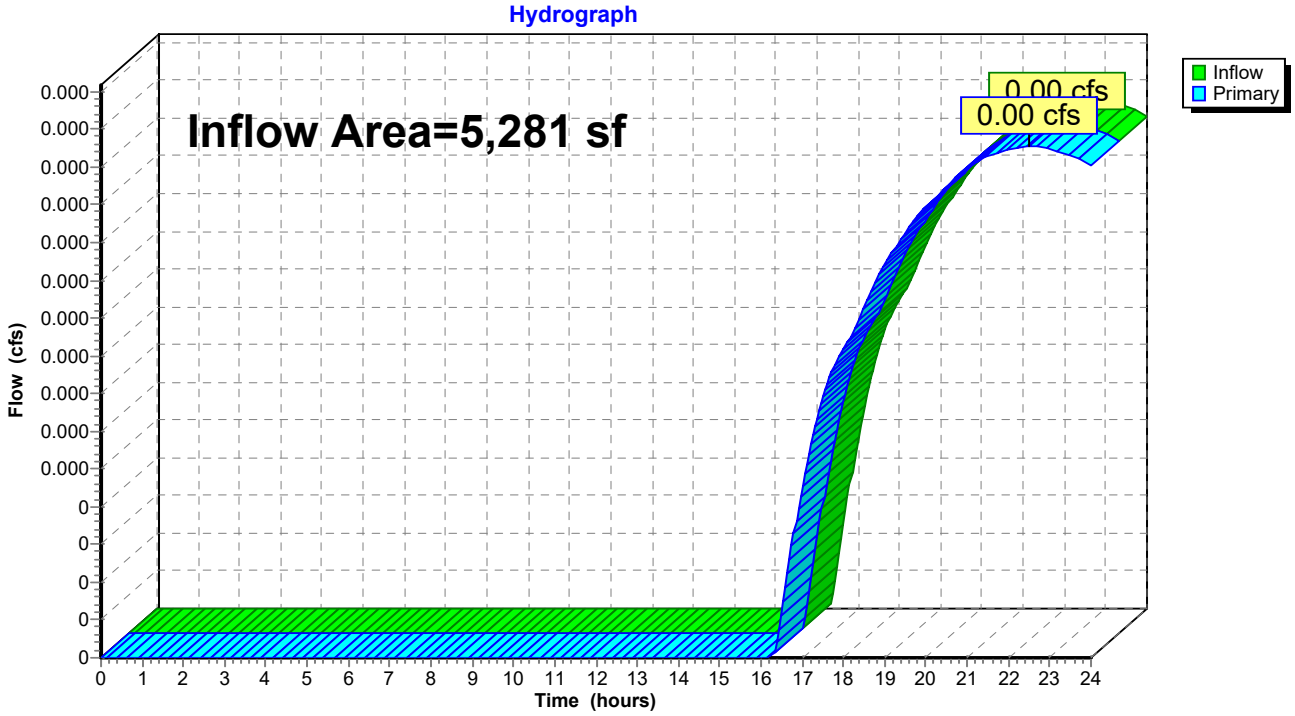
Summary for Pond SUM2: Sum Point - North

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

Inflow Area = 5,281 sf, 0.00% Impervious, Inflow Depth > 0.01" for 10-year event
Inflow = 0.00 cfs @ 22.49 hrs, Volume= 6 cf
Primary = 0.00 cfs @ 22.49 hrs, Volume= 6 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM2: Sum Point - North



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: Easterrn Portion of Site Runoff Area=45,655 sf 54.26% Impervious Runoff Depth>5.61"
Flow Length=180' Slope=0.0200 '/' Tc=6.0 min CN=WQ Runoff=5.89 cfs 21,325 cf

Subcatchment 1P-BUILD: Prop. Bldg. Runoff Area=7,140 sf 100.00% Impervious Runoff Depth>7.80"
Tc=6.0 min CN=WQ Runoff=1.26 cfs 4,638 cf

Subcatchment 2P: Western Portion of Site Runoff Area=5,281 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=157' Tc=13.1 min CN=30 Runoff=0.01 cfs 186 cf

Pond IG-1: SUBSERFACE GALLEREY Peak Elev=133.72' Storage=0.157 af Inflow=5.89 cfs 21,325 cf
Discarded=0.64 cfs 21,316 cf Primary=0.00 cfs 0 cf Outflow=0.64 cfs 21,316 cf

Pond IG-2: SUBSERFACE GALLEREY Peak Elev=133.02' Storage=1,486 cf Inflow=1.26 cfs 4,638 cf
Discarded=0.13 cfs 4,636 cf Primary=0.00 cfs 0 cf Outflow=0.13 cfs 4,636 cf

Pond SUM1: Sum Point - West Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond SUM2: Sum Point - North Inflow=0.01 cfs 186 cf
Primary=0.01 cfs 186 cf

Total Runoff Area = 58,076 sf Runoff Volume = 26,150 cf Average Runoff Depth = 5.40"
45.05% Pervious = 26,164 sf 54.95% Impervious = 31,912 sf

Summary for Subcatchment 1P: Easterrn Portion of Site

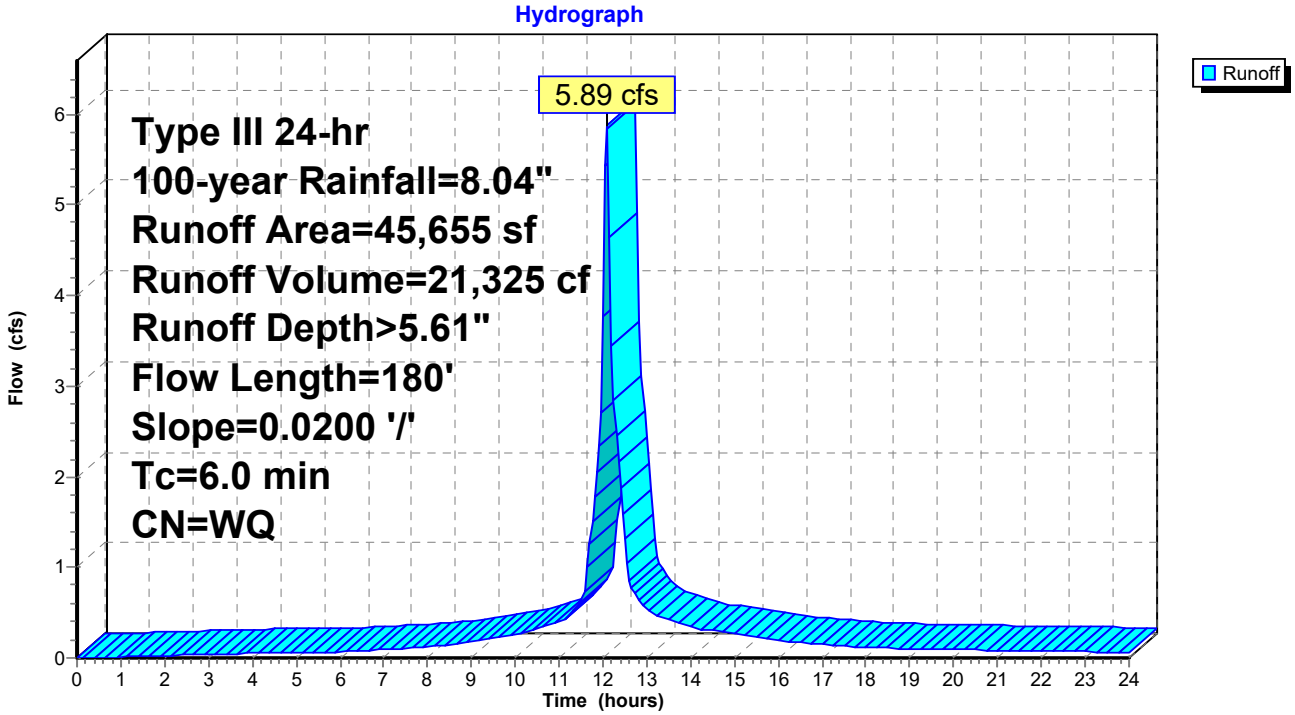
Runoff = 5.89 cfs @ 12.09 hrs, Volume= 21,325 cf, Depth> 5.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.04"

Area (sf)	CN	Description
24,772	98	Paved parking, HSG A
9,874	32	Woods/grass comb., Good, HSG A
11,009	76	Gravel roads, HSG A
45,655		Weighted Average
20,883		45.74% Pervious Area
24,772		54.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	130	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	50	0.0200	1.23		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
4.5					**Direct Entry, MIN, Tc**
6.0	180	Total			

Subcatchment 1P: Easterrn Portion of Site



Summary for Subcatchment 1P-BUILD: Prop. Bldg.

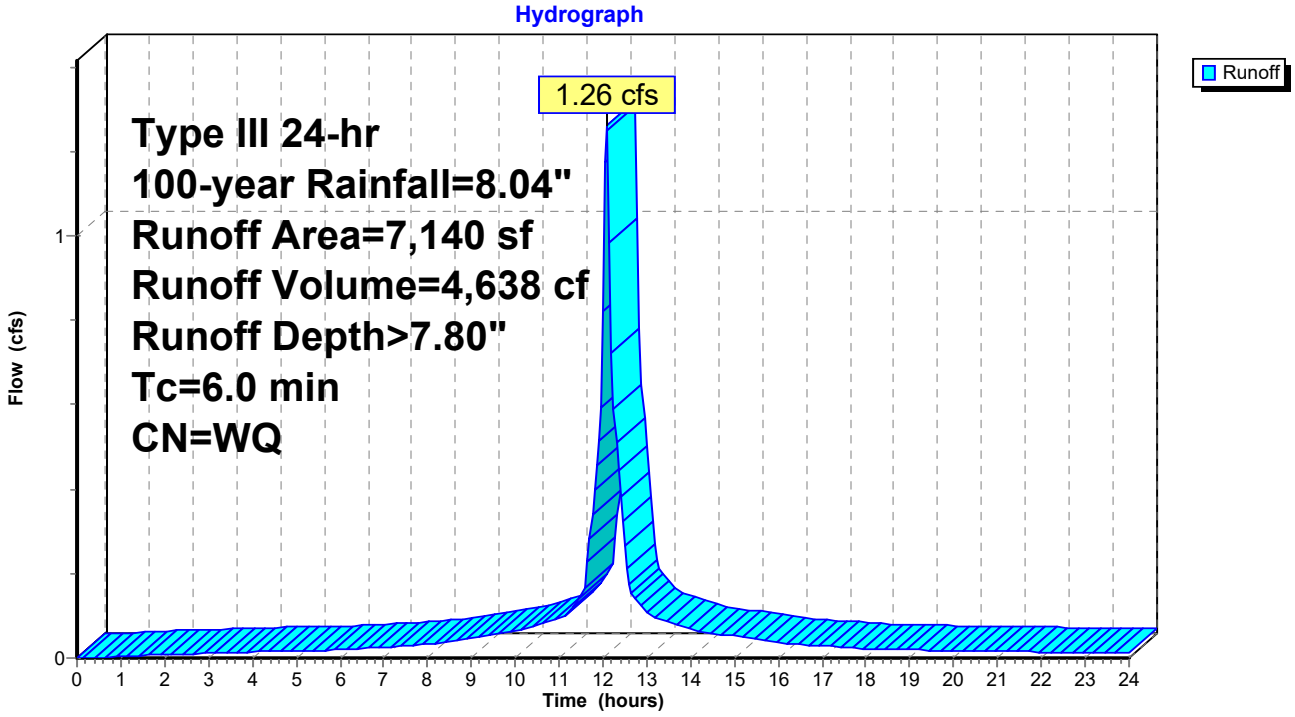
Runoff = 1.26 cfs @ 12.09 hrs, Volume= 4,638 cf, Depth> 7.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.04"

Area (sf)	CN	Description
7,140	98	Roofs, HSG A
0	76	Gravel roads, HSG A
7,140		Weighted Average
7,140		100.00% Impervious Area

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

Subcatchment 1P-BUILD: Prop. Bldg.



Summary for Subcatchment 2P: Western Portion of Site

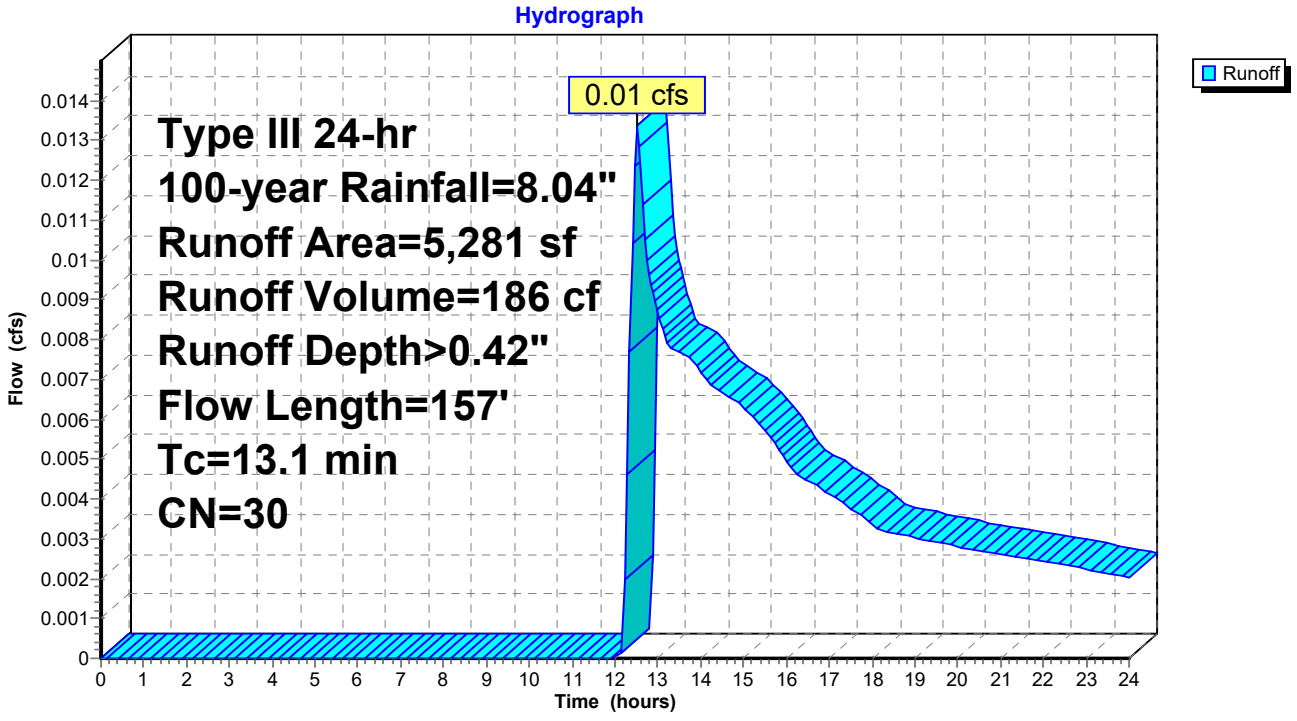
Runoff = 0.01 cfs @ 12.52 hrs, Volume= 186 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.04"

Area (sf)	CN	Description
5,281	30	Woods, Good, HSG A
5,281		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	107	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	157	Total			

Subcatchment 2P: Western Portion of Site



Summary for Pond IG-1: SUBSERFACE GALLEREY

Inflow Area = 45,655 sf, 54.26% Impervious, Inflow Depth > 5.61" for 100-year event
Inflow = 5.89 cfs @ 12.09 hrs, Volume= 21,325 cf
Outflow = 0.64 cfs @ 12.50 hrs, Volume= 21,316 cf, Atten= 89%, Lag= 24.7 min
Discarded = 0.64 cfs @ 12.50 hrs, Volume= 21,316 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 133.72' @ 12.83 hrs Surf.Area= 0.064 ac Storage= 0.157 af

Plug-Flow detention time= 72.0 min calculated for 21,272 cf (100% of inflow)
Center-of-Mass det. time= 71.6 min (832.9 - 761.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.50'	0.053 af	**22.00'W x 126.00'L x 4.50'H Field A** 0.286 af Overall - 0.154 af Embedded = 0.133 af x 40.0% Voids
#2A	130.50'	0.111 af	**Concrete Galley 4x4x3** x 155 Inside #1 Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf 155 Chambers in 5 Rows
#3	133.20'	0.001 af	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		0.165 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.20'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	129.50'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.64 cfs @ 12.50 hrs HW=133.53' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.64 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.50' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Pond IG-1: SUBSERFACE GALLEREY - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x3 (Concrete Galley, Shea LE-EGLPH, LE-CGLPH or equivalent)
Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf
Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf

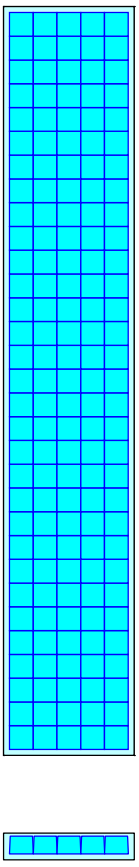
31 Chambers/Row x 4.00' Long = 124.00' Row Length +12.0" End Stone x 2 = 126.00' Base Length
5 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 22.00' Base Width
12.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.50' Field Height

155 Chambers x 31.2 cf = 4,834.7 cf Chamber Storage
155 Chambers x 43.2 cf = 6,701.5 cf Displacement

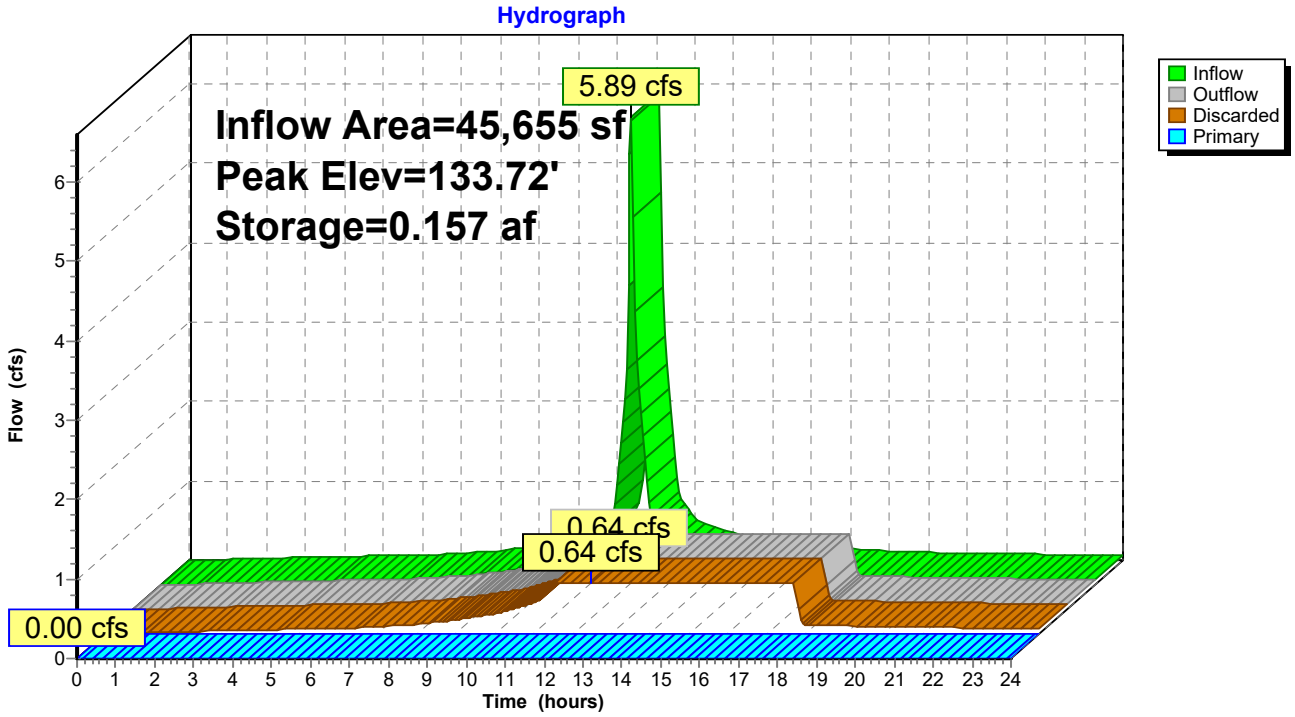
12,474.0 cf Field - 6,701.5 cf Chambers = 5,772.5 cf Stone x 40.0% Voids = 2,309.0 cf Stone Storage

Chamber Storage + Stone Storage = 7,143.7 cf = 0.164 af
Overall Storage Efficiency = 57.3%
Overall System Size = 126.00' x 22.00' x 4.50'

155 Chambers
462.0 cy Field
213.8 cy Stone



Pond IG-1: SUBSERFACE GALLEREY



Summary for Pond IG-2: SUBSERFACE GALLEREY

Inflow Area = 7,140 sf,100.00% Impervious, Inflow Depth > 7.80" for 100-year event
Inflow = 1.26 cfs @ 12.09 hrs, Volume= 4,638 cf
Outflow = 0.13 cfs @ 11.50 hrs, Volume= 4,636 cf, Atten= 89%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.50 hrs, Volume= 4,636 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 133.02' @ 12.79 hrs Surf.Area= 700 sf Storage= 1,486 cf

Plug-Flow detention time= 72.0 min calculated for 4,636 cf (100% of inflow)
Center-of-Mass det. time= 71.7 min (812.4 - 740.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.50'	427 cf	**14.00'W x 50.00'L x 3.75'H Field A** 2,625 cf Overall - 1,556 cf Embedded = 1,069 cf x 40.0% Voids
#2A	130.00'	1,123 cf	**Concrete Galley 4x4x3** x 36 Inside #1 Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf 36 Chambers in 3 Rows
#3	133.20'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		1,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.20'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	129.50'	**8.240 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.50 hrs HW=129.59' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.50' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Pond IG-2: SUBSERFACE GALLEREY - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x3 (Concrete Galley, Shea LE-EGLPH, LE-CGLPH or equivalent)
Inside= 42.0"W x 30.0"H => 8.91 sf x 3.50'L = 31.2 cf
Outside= 48.0"W x 36.0"H => 10.81 sf x 4.00'L = 43.2 cf

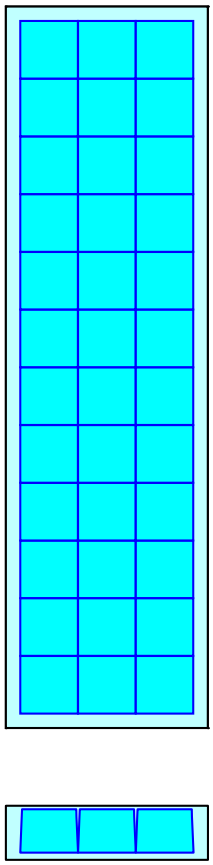
12 Chambers/Row x 4.00' Long = 48.00' Row Length +12.0" End Stone x 2 = 50.00' Base Length
3 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 14.00' Base Width
6.0" Base + 36.0" Chamber Height + 3.0" Cover = 3.75' Field Height

36 Chambers x 31.2 cf = 1,122.9 cf Chamber Storage
36 Chambers x 43.2 cf = 1,556.5 cf Displacement

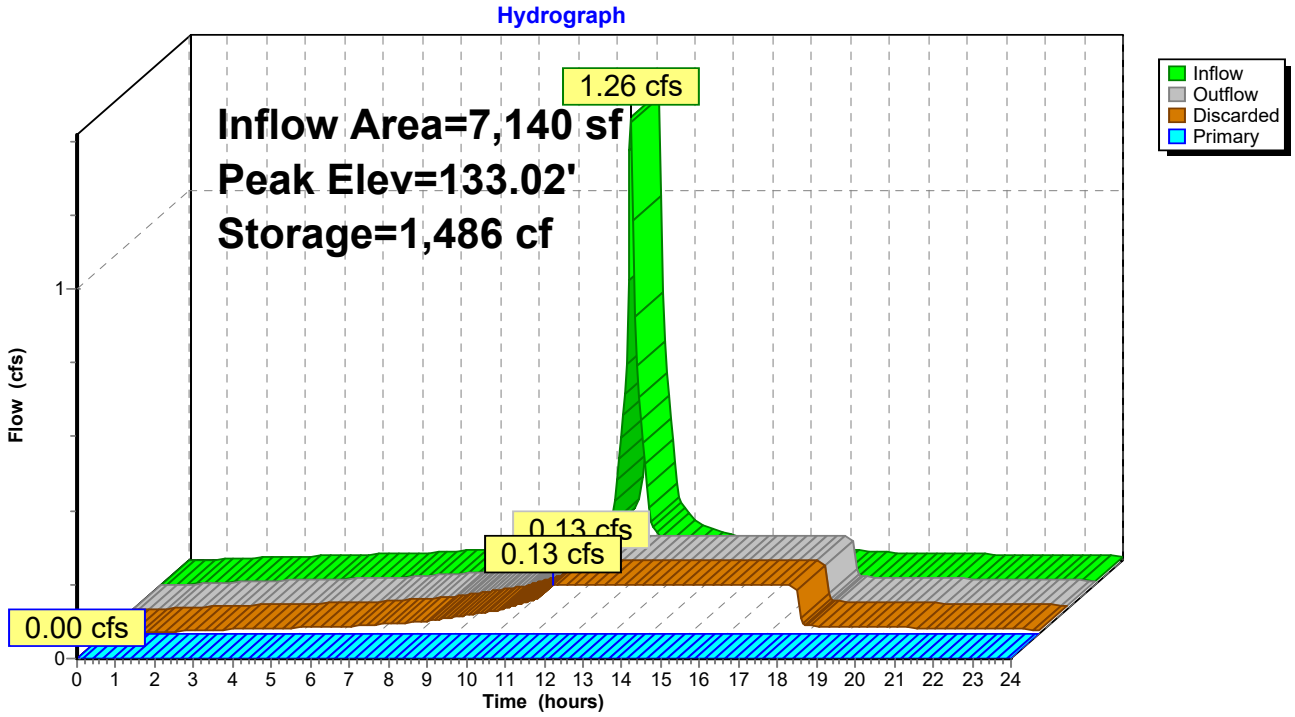
2,625.0 cf Field - 1,556.5 cf Chambers = 1,068.5 cf Stone x 40.0% Voids = 427.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,550.3 cf = 0.036 af
Overall Storage Efficiency = 59.1%
Overall System Size = 50.00' x 14.00' x 3.75'

36 Chambers
97.2 cy Field
39.6 cy Stone



Pond IG-2: SUBSERFACE GALLEREY



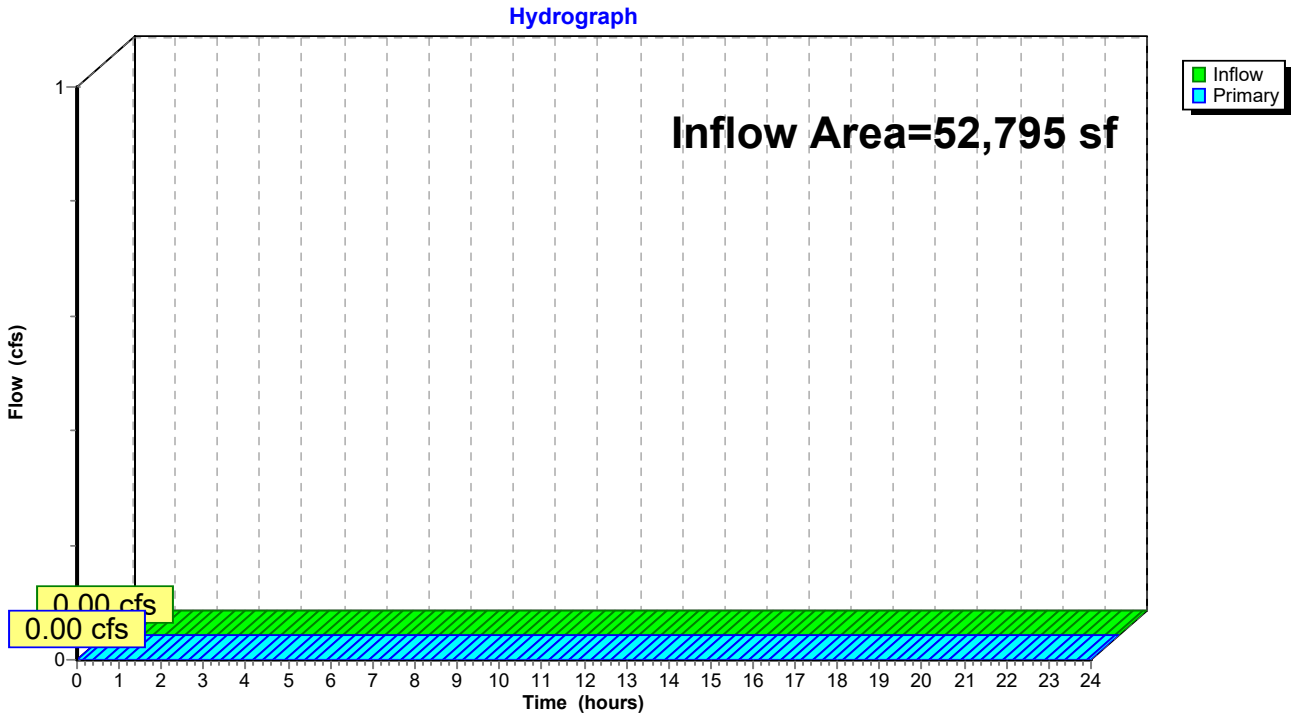
Summary for Pond SUM1: Sum Point - West

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

Inflow Area = 52,795 sf, 60.45% Impervious, Inflow Depth = 0.00" for 100-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM1: Sum Point - West



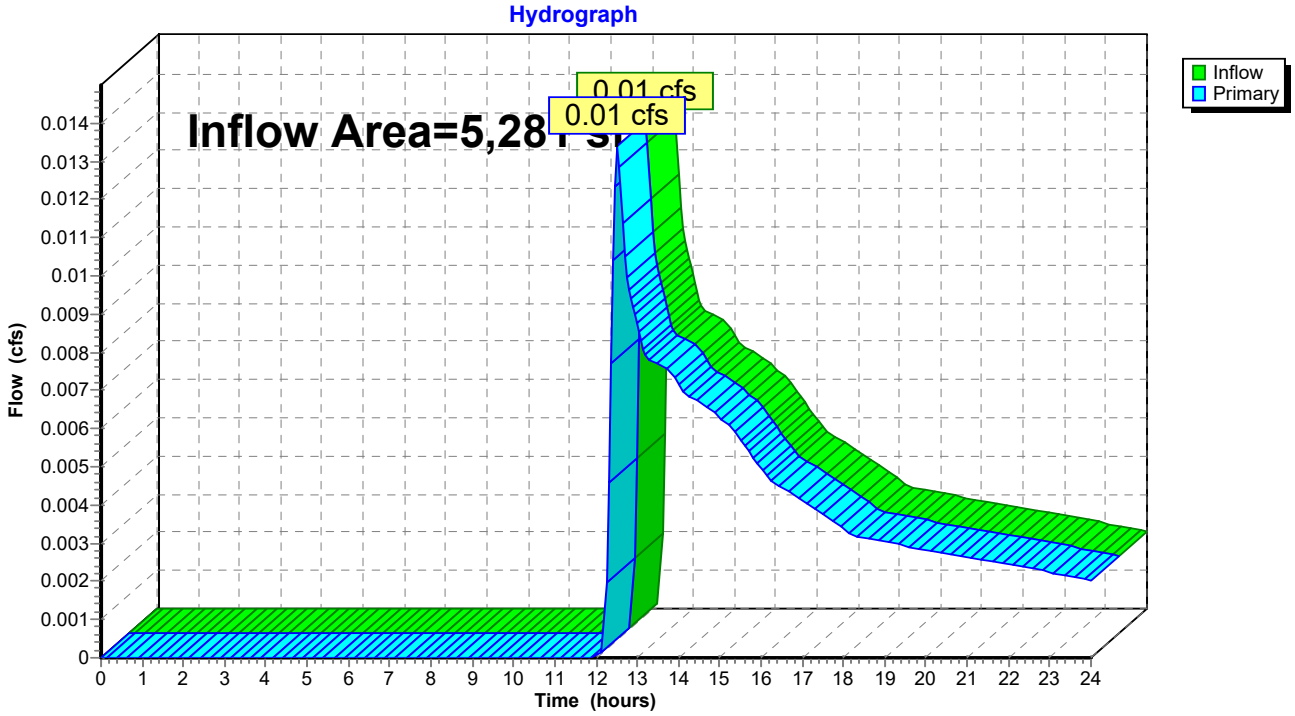
Summary for Pond SUM2: Sum Point - North

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

Inflow Area = 5,281 sf, 0.00% Impervious, Inflow Depth > 0.42" for 100-year event
Inflow = 0.01 cfs @ 12.52 hrs, Volume= 186 cf
Primary = 0.01 cfs @ 12.52 hrs, Volume= 186 cf, Atten= 0%, Lag= 0.0 min

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

Pond SUM2: Sum Point - North



APPENDIX C

Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan

CONSTRUCTION PERIOD
EROSION AND SEDIMENTATION CONTROL SUMMARY

The following measures shall be maintained throughout the site construction phase of the project.

Catch Basin Protection:
Existing and proposed catch basins shall be protected with haybale barriers and/or inlet filters prior to the completion of paving. Hay bales shall also be placed around grates and catch basins within the construction/demolition areas to ensure that runoff entering the catch basin has been filtered prior to discharge.

Stabilized Construction Entrance:
A temporary stabilized construction entrance shall be installed at the entrance to the project. The purpose of the construction entrance is to remove sediment attached to vehicle tires and minimize its transport and deposition onto public road surfaces. The construction entrance shall be composed of a 6-inch thick (minimum) bed of coarse crushed stone that extends a minimum of 25 feet into the Subject Property. The construction entrance shall be a minimum of 20 feet wide. The crushed stone bed shall be replenished as necessary to maintain the proper function.

Silt Fences:
Silt fences shall be placed at the limits of work where the slope is less than 4:1. They shall be placed in a sturdy, upright position and supported/anchored to withstand the forces of the elements and the circumstances of construction activities. The fences shall be installed in a manner that shall prevent runoff from passing over, under, or around the fence (i.e. all of the runoff shall pass through the fence). They shall be attached to posts (either steel or wood) in sufficient number to support the fence. The posts shall typically be placed 4 to 8 feet apart. It shall be the construction/demolition contractor's responsibility to maintain the fence in a functional condition throughout the duration of construction/demolition activities. The contractor shall also remove any large accumulations of sediment in a timely manner and dispose the material appropriately.

Materials Management Practices:
The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff during the course of construction. The Contractor's Superintendent shall be responsible for ensuring that these procedures are followed:

1. *Good Housekeeping*

   The following good housekeeping practices shall be followed on-site during construction:

   a. An effort shall be made to store only enough products required to do the job.
   b. All materials stored on-site shall be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers shall be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
   c. Products shall be kept in their original containers with the original manufacturer's label in legible condition.
   d. Substances shall not be mixed with one another unless recommended by the manufacturer.

e. Whenever possible, all of a product shall be used up before disposing the container.
f. Manufacturer's recommendations for proper use and disposal shall be followed.
g. The Contractor's Superintendent shall be responsible for daily inspections to ensure proper use and disposal of materials.

2. *Hazardous Substances*

These practices shall be used to reduce the risks associated with hazardous substances. Material Safety Data Sheets (MSDSs) for each product with hazardous properties that is used at the Project shall be obtained and used for the proper management of potential wastes that may result from these products. A MSDS shall be posted in the immediate area where such product is stored and/or used and another copy of each MSDS shall be maintained in the job trailer at the Project. Each employee who must handle a Hazardous Substance shall be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.

a. Products shall be kept in original containers with the original labels in legible condition.
b. Original labels and MSDSs shall be procured and used for each product.
c. If surplus product must be disposed, manufacturer's and local/state/federal required methods for proper disposal must be followed.

3. *Hazardous Waste*

It is imperative that all hazardous waste be properly identified and handled in accordance with all applicable hazardous waste standards, including the storage, transport and disposal of the hazardous wastes. There are significant penalties for the improper handling of hazardous wastes. It is important that the Contractor's Superintendent seeks appropriate assistance in making the determination of whether a substance or material is a hazardous waste. For example, hazardous waste may include certain Hazardous Substances, as well as pesticides, paints, paint solvents, cleaning solvents, pesticides, contaminated soils, and other materials, substances or chemicals that have been discarded (or are to be discarded) as being out-of-date, contaminated, or otherwise unusable, and can include the containers for those substances; other materials and substances can also be or become Hazardous Wastes, however. The Contractor's Superintendent is also responsible for ensuring that all site personnel are instructed as to these Hazardous Waste requirements and also that the requirements are being followed.

4. *Product Specific Practices*

The following product specific practices shall be followed on the job site:

<u>Petroleum Products</u>
All on-site vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products shall not be stored at the Subject Property.

Fertilizers

Fertilizers shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked in the soil to limit exposure to stormwater. The contents of any partially used bags of fertilizer shall be transferred to a sealable plastic bin to avoid spills.

Cleaning Solvents

All containers shall be tightly sealed and stored when not in use. Excess solvents shall not be discharged to the storm sewer system, but shall be properly disposed of according to manufacturer's instructions or state and federal regulations.

Concrete Wastes

Concrete trucks shall be allowed to wash out or discharge surplus concrete or drum wash water on the Subject Property, but only in specifically designated diked and impervious washouts which have been prepared to prevent contact between the concrete wash and stormwater. Waste generated from concrete wash water shall not be allowed to flow into drainage ways, inlets, receiving waters or any location other than the designated concrete washout. Waste concrete may be poured into forms to make rip-rap or other useful concrete products. Concrete washouts shall be located at minimum 100 linear feet from drainage ways, inlets, surface waters and wetland resource areas.

The hardened residue from the concrete washout diked areas shall be disposed in the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the Contractor. Maintenance of the washout is to include removal of hardened concrete. The Contractor's Superintendent shall be responsible for seeing that these procedures are followed.

Saw-cut Portland Cement Concrete (PCC) slurry shall not be allowed to enter storm drains or watercourses. Saw-cut residue should not be left on the surface of pavement or be allowed to flow over and off pavement. Residue from saw-cutting and grinding shall be collected by vacuum and disposed in the same manner as excess concrete.

5. Solid and Construction Wastes

All waste materials shall be collected and disposed at an appropriate solid waste disposal area.

6. Sanitary Wastes

A minimum of one portable sanitary unit shall be provided for every ten (10) workers present during the construction period. All sanitary waste shall be collected from the portable units a minimum of one time per week by a licensed portable facility provider in complete compliance with local and state regulations.

All portable sanitary units shall be located in an area where the likelihood of the unit contributing to stormwater discharges is negligible. Additional containment BMPs must be implemented, such as gravel bags or specially designed plastic skid containers around the base, to prevent wastes from contributing to stormwater discharges.

APPENDIX D

Long Term Operation and Maintenance Plan

1.0 INTRODUCTION

The proposed stormwater controls have been designed to ensure stormwater quality. In order for this to continue in the long term, it is necessary to implement the following long term Operation and Maintenance Program.

2.0 RESPONSIBLE PARTY

Owner:

Priolo Concrete Forms, Inc.
233 Pembroke Street
Carver, MA 02048

Responsible for Operation, Maintenance and Emergency Repairs:

Priolo Concrete Forms, Inc.
233 Pembroke Street
Carver, MA 02048

Notification of Future Property Owners:

Prior to any sale of the property in the future, the prospective buyer would be made aware of the presence of stormwater management systems and the requirement for proper operation and maintenance.

3.0 MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES

The stormwater management facilities were designed to require little or no intervention in the operation and to require relatively little maintenance once the stormwater controls are installed. However, the drainage improvements shall be subject to the following maintenance schedule.

3.1 Routine Maintenance

The following areas, system components, and measures will be inspected and the identified deficiencies will be corrected. Plans and details of the stormwater management system components are presented on the Project Plans. Maintenance of the system components may include the removal and legal disposal of any accumulated sediments and debris. The following standards will be met after construction is complete:

Catch Basins:
Inspect catch basins at least four (4) times per year and at the end of the foliage and snow removal seasons, to ensure that the catch basins are working in their intended fashion and they are free of debris. Catch basin shall be cleaned when sediment depths reach 12-inches from the invert of the outlet. If the catch basin outlet is designed with a hood to trap floatable materials (i.e., a snout), check to ensure that the watertight seal is working properly. At a minimum, remove floating debris and hydrocarbons at the time of the inspection.

Water Quality Inlets:
Inspect the CDS 2015_4 unit at a minimum of four (4) times per year and at the end of the foliage and snow removal seasons. At a minimum, remove floating debris and hydrocarbons at the time of the inspection. Clean structures when sediment depths reach 8-inches.

Infiltration Gallery (Dry-Well):
Inspect the infiltration system at least four (4) times per year and at the end of the foliage and snow removal seasons, to ensure that there is no sediment or debris entering the infiltration system. The infiltration system shall be cleaned when sediment is observed at depths of 2-inches.

Vegetated Areas:
Inspect vegetated areas early in the growing season to identify active or potential erosion problems. Re-plant bare areas, or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

Roadways & Parking Areas:
Clear accumulations of winter sand in parking lots and along roadways at least once per year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping.

3.2 Non-Routine Maintenance

All water quality inlets, grates and pipes should be inspected once every four (4) years for proper function, clogging, signs of deterioration and structural inadequacy. Any adverse situations are to be repaired as needed.

3.3 Non-Periodic Inspection

The storm water management system shall be inspected after two years of full operation by a Registered Professional Civil Engineer to confirm its adequacy. The inspection shall include an examination of all components of the system.

3.4 Record keeping

A maintenance inspection report will be made after each inspection. Maintenance inspection reports shall be maintained by the Owner for a period of no less than 5-years.

4.0 PUBLIC SAFETY FEATURES

The stormwater management facilities were designed to be inherently safe.

5.0 ESTIMATED O&M BUDGET

The estimated annual budget to conduct the specified operation and maintenance is approximately Two thousand dollars per year ($2000/year).

ATTACHMENT A

INSPECTION LOG

Stormwater BMP Inspection Maintenance Checklist **May 2022**
Priolo Site - Forest Road, Carver

Site Status: _____

Date: _____ **Time:** _____ **Site Conditions:** _____

Inspection Frequency Key: A=annual; Q=quaterly and at the end of foliage and snow removal seasons

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	*A/Q*			
Inlets and Outles free of debris?	*A/Q*			
Facility (internally) free of debris?	*A/Q*			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material)	*A/Q*			
Grass mowed?	*A/Q*			
Catch Basins				
sump level?	*A/Q*			
Sediment level?	*A/Q*			
CDS Unit				
sump level?	*A/Q*			
Sediment level?	*A/Q*			
Dry Well				
Sign of differential settlement	*A/Q*			
Sediment Accumulation	*A/Q*			
Structural Components				
Any evidence of structural deterioration?	*A*			
Grates in good condition?	*A*			
Spalling or cracking of structural parts?	*A*			
Outlet/Overflow Spillway	*A*			
Other				
Noticeable odors?	*A*			
Evidence of flow bypassing facility?	*A*			
Other?	*A*			

Inspector Comments: _____

Overall Condition of Facility: ☐ Acceptable ☐ Unacceptable

If any of the Inpection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below:

Maintenance Action Needed	Due Date

The Next Routine inspection is scheduled for approximately: _____ (Date)

Inspected by: (Signature) _____

Inspected by: (Printed) _____