



MILLENNIUM ENGINEERING, INC.

Land Surveyors and Civil Engineers

STORMWATER MANAGEMENT REPORT

FOR THE

PROPOSED SITE IMPROVEMENTS

AT

**80 HAVERHILL ROAD
AMESBURY, MA**

PREPARED FOR:

**80 HAVERHILL ROAD, LLC
80 HAVERHILL ROAD
AMESBURY, MA**



DATE: NOVEMBER 8, 2024
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80 Haverhill Road Amesbury, MA

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I. Introduction

Introduction

The subject parcel is described as Tax Map 85, Lot 59 on the City of Amesbury, MA Assessor's Map. The project parcel is 23,332 S.F. in size. Elevations on the site range from 125.00' at the existing dwelling to 119.00' at the southwest end of the site. These elevations are based upon 1988 NAV datum.

The proposed improvements at 80 Haverhill Road include the rehabilitation of the existing historical building and addition off the rear of the building to create 8 total dwelling units. The project will consist of rehabbing the historical building, the construction of the addition off the rear of the building and the construction of a new residential driveway with all associated utilities.

The proposed stormwater management system for the project includes catch basins, proprietary separators and subsurface infiltration structures. The catch basins and Contech CDS units will remove suspended solids prior to discharging to the infiltration areas. The infiltration areas will provide stormwater recharge to the groundwater and mitigate peak runoff rates to ensure the post-development runoff rates will be less than or equal to the pre-development rates. Roof drywells are also proposed to recharge roof runoff to the groundwater.

II. Stormwater Management Checklist



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 8²
- 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.



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.

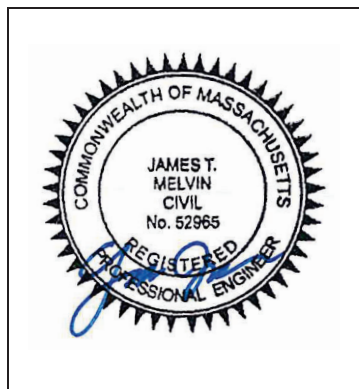
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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 Field¹
- ☐ 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)

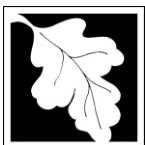
- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary 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.

III. Hydrologic Analysis

Existing Site Characteristics

In general, the property is irregular in shape and fronts Haverhill Road. The entire property is upland with no resource areas located on-site. An existing Multi-family dwelling with associated barn, driveway, parking, patio, decks and utilities is located on-site. See the accompanying plan for a more detailed description of the existing site conditions and topography.

The lot consists of two soil groups: Deerfield loamy fine sand, 256A (Hydrologic Soil Group A); and Canton fine sandy loam, 420B (Hydrologic Soil Group B). 16 test pits were performed onsite in August 2024. The test pits indicated loamy sand material present throughout most of the site. See Appendix E for the NRCS soil map.

Proposed Site Features

The Applicant proposes to rehab the existing dwelling to create 8 residential units. Access to the property will remain nearly the same via Haverhill Road. A new 18' wide driveway will be constructed with adequate parking provided for the 8 units. Underground electrical and telecommunications service will also be provided. Sewer and water services are proposed to be connected to the City of Amesbury's 24" sewer main and 12" water main located in the Haverhill Road Right of Way.

In order to address stormwater management regulations, catch basins, Contech Water Quality Units, subsurface infiltration areas, and roof drywells are proposed to treat, store, and infiltrate runoff.

WATERSHED ANALYSIS AND METHODOLOGY

The stormwater runoff management system was analyzed using the storm events of the 2-year, 10-year and 100-year frequency. The analysis was performed using HydroCAD, version 10.00. Using USDA NRCS TR-20 and TR-55 methods of estimating runoff, the program uses the measured characteristics of the site and computes runoff produced by simulated rainfall events. The results are then used to design runoff control structures.

Existing drainage area boundaries were developed using an onsite topographic survey performed by Millennium Engineering, Inc. Proposed site development boundaries were developed from proposed grades and ground cover designed to minimize site storm water management structure requirements.

Hydrologic soil groups and curve numbers were estimated for existing and proposed developed conditions using available NRCS Soil Maps, current vegetation, and terrain.

DRAINAGE ANALYSIS

The purpose of the drainage analysis is two-fold. The first is to analyze and quantify the pre-development runoff flows through the site. The second purpose is to evaluate the impact of the proposed development on drainage patterns and flows, both within and outside the site, and to design a stormwater management system to adequately convey post-development runoff.

The design of the stormwater management system has the following goals:

- 1.) Minimize or eliminate erosion and sedimentation during construction as well as after development.
- 2.) To ensure that post-development flows do not have an adverse effect on downstream drainage structures and landowners.
- 3.) To design a stormwater and treatment system which will carry the surface runoff and satisfy goals one and two.

To determine the hydrological effect of the proposed development on the watershed, the existing conditions must first be analyzed.

WATERSHED DESCRIPTION: EXISTING CONDITIONS

Depending on the soil classification, type of ground cover present and the direction of the flow of runoff, the existing site is divided into watershed areas. Watershed area E1 consists of the front of the site and drains off to the north towards Haverhill Road. Area E2 consists of the western portion of the site that flows towards directly west to the abutting property. Area E3 consists of a smaller portion at the south east corner of the site that flows south to the abutting property. See the attached plans (Watersheds and HydroCad Data, sheet 1 of 2) for the watershed area boundaries and the pre-development time of concentration flow paths.

WATERSHED ANALYSIS: EXISTING CONDITIONS

The existing conditions were modeled using the tabular hydrograph method with a Type III synthetic storm distribution for the 2, 10 and 100-year storm recurrence intervals. Runoff hydrographs were produced to estimate existing peak discharge.

Flows for the three storm simulations are as follows:

Existing (Pre-development) Peak Runoff Rates (c.f.s.)					
Subcatchment	Size	2 Yr	10 Yr	25 Yr	100 Yr
	(Acres)	Storm	Storm	Storm	Storm
DP1	0.18	0.12	0.34	0.55	1.03
DP2	0.32	0.01	0.15	0.40	1.05
DP3	0.12	0.09	0.23	0.36	0.65
DP4	0.02	0.00	0.00	0.02	0.06

The pre-development drainage calculations can be found in Appendix A.

WATERSHED DESCRIPTION: POST-DEVELOPMENT CONDITIONS

To determine the post development runoff, new watersheds, runoff curve numbers and times of concentration were generated reflecting the changes in the topography and surface cover. The post-development watersheds are shown on the attached plans (Watersheds and HydroCad Data, sheet 2 of 2). Watershed area P1 consists of the lawn, and some roof areas at the front of the lot abutting Haverhill Road. The runoff flows directly over land towards Haverhill Road. Watershed Area P2 consist of the western portion of the site containing roof and lawn surfaces and flows directly offsite to the west. Watershed area P3 is located at the southern most part of the site containing grass area and runs off directly to the southern abutter. Watershed area P4 is located at the eastern edge of the site and runs directly to the abutting property (78 Haverhill Road). Watershed areas P6A and P6B consist of portions of the proposed driveways, and some lawn area. These areas are directed into catch basins #3 and #4, into the Contech water quality unit #2, into subsurface infiltration system #2 and recharged into the ground. Watershed areas P5A and P5B consist of portions of the proposed paved driveway to the north of the site. These areas are directed into catch basins #1 and #2, into the Contech water quality unit #1, and into subsurface infiltration system #1 and recharged into the ground. Lastly, sub-catchment P6 contains roof area from the proposed barn addition. The runoff is collected roof gutters/down spouts and piped to subsurface infiltration system #3.

WATERSHED ANALYSIS: POST-DEVELOPMENT CONDITIONS

The proposed developed conditions were modeled using the tabular hydrograph method with a Type III synthetic storm distribution for the 2, 10 and 100-year storm recurrence intervals. Runoff hydrographs were produced to estimate the post-development peak discharge.

Flows for the three storm simulations are as follows:

Post-Developed Peak Runoff Rates (c.f.s.)

Subcatchment	Size (Acres)	2 Yr Storm	10 Yr Storm	25 Yr Storm	100 Yr Storm
DP1	0.10	0.00	0.02	0.08	0.26
DP2	0.20	0.01	0.13	0.30	0.72
DP3	0.01	0.00	0.00	0.00	0.01
DP4	0.01	0.00	0.00	0.00	0.02

The post-development drainage calculations can be found in Appendix B.

**Sub-catchments P5A, P5B, P6A, P6B and P7 are not included in this table because they drainage to subsurface infiltration systems in which the flow is recharged into the ground and the runoff is 0cfs.*

WATERSHED ANALYSIS: SUMMARY TABLE

Subcatchment	Size	2 Yr	10 Yr	25 Yr	100 Yr
	(Acres)	Storm	Storm	Storm	Storm
Pre-Dev					
DP 1	0.18	0.12	0.34	0.55	1.03
DP 2	0.32	0.01	0.15	0.40	1.05
DP 3	0.12	0.09	0.23	0.36	0.65
DP 4	0.02	0.00	0.00	0.02	0.06
Post-Dev					
DP1	0.10	0.00	0.02	0.08	0.26
DP2	0.20	0.01	0.13	0.30	0.72
DP3	0.01	0.00	0.00	0.00	0.01
DP4	0.01	0.00	0.00	0.00	0.02

IV. Stormwater Recharge Calculations

Stormwater Recharge Calculations

Calculations were performed to ensure that the proposed project will comply with the groundwater recharge requirements of the Mass DEP Stormwater Management Standards. The required recharge volume was calculated as follows:

The Required Recharge Volume equals a depth of runoff corresponding to the soil type times the impervious areas located on site.

$R_v = F \times \text{Impervious area}$ Where:

R_v = Required Recharge Volume, expressed in cubic feet

F = Target Depth Factor associated with each Hydrologic Soil

Group Impervious Area = pavement and rooftop area on site

For the proposed project:

Required Recharge volume, R_v (A soil) = $F \times \text{impervious area}$
= 0.6 in * 13,632 s.f.
= 663 c.f.

Total Required Recharge Volume = 663 c.f.

Total Recharge provided = 3,072 c.f.

Subsurface Inf. #1= 557 c.f.

Subsurface Inf. #2= 1,690 c.f.

Subsurface Inf. #3= 825 c.f.

Adjusted Required Recharge Volume

Since only a portion of the new impervious areas are to be directed into the infiltration BMP, it is necessary to calculate an Adjusted Required Recharge Volume:

1. The Required Recharge Volume = 663 cubic feet
2. The total proposed impervious area is 13,632 s.f.
3. The proposed impervious area draining to all infiltration areas is 11,212 s.f.
4. The ratio of total site impervious area to impervious area draining to the infiltration BMP is $13,632 / 11,212 = 1.21$
5. The Adjusted Required Recharge Volume = $1.21 \times 663 \text{ cubic feet} = 803 \text{ cubic feet}$.

Stormwater recharge will be accomplished on the site through the infiltration areas to be constructed.

Total Recharge provided = 3,072 c.f.

Drawdown Calculation

Subsurface Infiltration #1

Drawdown Time = $\frac{R_v}{\text{_____}}$

(K) (Bottom Area)

$R_v = \text{Storage Volume} = 557 \text{ c.f.}$

$K = \text{Saturated Hydraulic Conductivity} = 2.41 \text{ in./hr}$

$\text{Bottom Area} = 281 \text{ s.f.}$

Drawdown Time = $\frac{557 \text{ c.f.}}{\text{_____}}$

$(2.41 \text{ in/hr})(1\text{ft}/12\text{in})(281 \text{ s.f.})$

Drawdown Time = 9.87 hours

Subsurface infiltration #2

$$\text{Drawdown Time} = \frac{R_v}{(K) (\text{Bottom Area})}$$

$R_v = \text{Storage Volume} = 1,690 \text{ c.f.}$

$K = \text{Saturated Hydraulic Conductivity} = 2.41 \text{ in./hr}$

$\text{Bottom Area} = 1,494 \text{ s.f.}$

$$\text{Drawdown Time} = \frac{1,690 \text{ c.f.}}{(2.41 \text{ in/hr})(1\text{ft}/12\text{in})(1,494 \text{ s.f.})}$$

Drawdown Time = 5.63 hours

Subsurface infiltration #3

$$\text{Drawdown Time} = \frac{R_v}{(K) (\text{Bottom Area})}$$

$R_v = \text{Storage Volume} = 825 \text{ c.f.}$

$K = \text{Saturated Hydraulic Conductivity} = 2.41 \text{ in./hr}$

$\text{Bottom Area} = 505 \text{ s.f.}$

$$\text{Drawdown Time} = \frac{825 \text{ c.f.}}{(2.41 \text{ in/hr})(1\text{ft}/12\text{in})(505 \text{ s.f.})}$$

Drawdown Time = 8.13 hours

V. TSS Removal Calculations

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

**80 HAVERHILL ROAD
AMESBURY, MA**

Area **0.05 ac**
Weighted C **0.9**
 t_c **5 min**
CDS Model **1515-3**

Unit Site Designation **CDS #1**
Rainfall Station # **67**

CDS Treatment Capacity **1.0 cfs**

<u>Rainfall Intensity¹</u> <u>(in/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (cfs)</u>	<u>Treated Flowrate (cfs)</u>	<u>Incremental Removal (%)</u>
0.08	41.0%	41.0%	0.00	0.00	39.8
0.16	23.9%	64.9%	0.01	0.01	23.1
0.24	11.5%	76.5%	0.01	0.01	11.1
0.32	7.4%	83.9%	0.01	0.01	7.1
0.40	4.4%	88.3%	0.02	0.02	4.3
0.48	2.9%	91.2%	0.02	0.02	2.8
0.56	1.8%	93.0%	0.02	0.02	1.7
0.64	1.2%	94.2%	0.03	0.03	1.1
0.72	1.6%	95.8%	0.03	0.03	1.5
0.80	0.8%	96.6%	0.03	0.03	0.8
1.00	0.6%	97.1%	0.04	0.04	0.5
1.40	1.4%	98.6%	0.06	0.06	1.3
1.80	0.9%	99.5%	0.07	0.07	0.8
2.20	0.5%	100.0%	0.09	0.09	0.5
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.5
Removal Efficiency Adjustment ² =					0.0%
Predicted % Annual Rainfall Treated =					100.0%
Predicted Net Annual Load Removal Efficiency =					96.5%

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

**80 HAVERHILL ROAD
AMESBURY, MA**

Area **0.14 ac**
Weighted C **0.9**
 t_c **5 min**
CDS Model **1515-3**

Unit Site Designation **CDS #2**
Rainfall Station # **67**

CDS Treatment Capacity **1.0 cfs**

<u>Rainfall Intensity¹</u> <u>(in/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (cfs)</u>	<u>Treated Flowrate (cfs)</u>	<u>Incremental Removal (%)</u>
0.08	41.0%	41.0%	0.01	0.01	39.6
0.16	23.9%	64.9%	0.02	0.02	22.9
0.24	11.5%	76.5%	0.03	0.03	11.0
0.32	7.4%	83.9%	0.04	0.04	7.0
0.40	4.4%	88.3%	0.05	0.05	4.2
0.48	2.9%	91.2%	0.06	0.06	2.7
0.56	1.8%	93.0%	0.07	0.07	1.6
0.64	1.2%	94.2%	0.08	0.08	1.1
0.72	1.6%	95.8%	0.09	0.09	1.5
0.80	0.8%	96.6%	0.10	0.10	0.7
1.00	0.6%	97.1%	0.12	0.12	0.5
1.40	1.4%	98.6%	0.17	0.17	1.2
1.80	0.9%	99.5%	0.22	0.22	0.7
2.20	0.5%	100.0%	0.27	0.27	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					95.2
Removal Efficiency Adjustment ² =					0.0%
Predicted % Annual Rainfall Treated =					100.0%
Predicted Net Annual Load Removal Efficiency =					95.2%

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

VI. Water Quality Calculations

Water Quality Calculations

The Massachusetts DEP requires water quality calculations based on 1 inch of runoff for the total impervious area associated with the proposed development. The following calculation identifies the water quality volume required.

Infiltration Area #1

Total Impervious Area contributing to Infiltration Area 1 = 1,968 s.f.
 $1,968 \text{ s.f.} \times 1" / 12 \text{ (to convert to ft)} = \mathbf{164 \text{ c.f. of runoff to be treated for water quality.}}$

Infiltration Area #2

Total Impervious Area contributing to Infiltration Area 2 = 4,186 s.f.
 $4,186 \text{ s.f.} \times 1" / 12 \text{ (to convert to ft)} = \mathbf{349 \text{ c.f. of runoff to be treated for water quality.}}$

** The required WQV is obtained through the CDS unit (see supporting documents)*

[illegible]

VII. Soils Analysis



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 **Essex County, Massachusetts, Northern Part**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 20, Aug 27, 2024

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	0.7	93.8%
420B	Canton fine sandy loam, 3 to 8 percent slopes	0.0	6.2%
Totals for Area of Interest		0.7	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.

Essex County, Massachusetts, Northern Part

256A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8

Elevation: 0 to 1,100 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 145 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Deerfield and similar soils: 85 percent

Minor components: 15 percent

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

Description of Deerfield

Setting

Landform: Outwash terraces, outwash deltas, outwash plains, kame terraces

Landform position (three-dimensional): Tread

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand

Bw - 9 to 25 inches: loamy fine sand

BC - 25 to 33 inches: fine sand

Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Negligible

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: About 15 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Sodium adsorption ratio, maximum: 11.0

Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: A

Ecological site: F144AY027MA - Moist Sandy Outwash

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent

Landform: Outwash terraces, kame terraces, outwash deltas, outwash plains

Landform position (three-dimensional): Tread

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

Wareham

Percent of map unit: 5 percent

Landform: Drainageways, depressions

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent

Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces

Landform position (three-dimensional): Tread

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent

Landform: Kame terraces, outwash plains, outwash terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex, linear

Across-slope shape: Convex, concave

Hydric soil rating: No

420B—Canton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w81b

Elevation: 0 to 1,180 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Canton and similar soils: 80 percent

Minor components: 20 percent

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

Description of Canton

Setting

Landform: Hills, moraines, ridges

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam

Bw1 - 7 to 15 inches: fine sandy loam

Bw2 - 15 to 26 inches: gravelly fine sandy loam

2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: B

Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Minor Components

Scituate

Percent of map unit: 10 percent

Landform: Hills, drumlins, ground moraines

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Montauk

Percent of map unit: 5 percent

Landform: Moraines, ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Custom Soil Resource Report

Charlton

Percent of map unit: 4 percent

Landform: Ridges, ground moraines, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Swansea

Percent of map unit: 1 percent

Landform: Marshes, depressions, bogs, swamps, kettles

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
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Custom Soil Resource Report

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SOIL SUITABILITY ASSESSMENT REPORT

COMMONWEALTH OF MASSACHUSETTS

AMESBURY, MASSACHUSETTS

SOIL EVALUATION FOR ON-SITE STORMWATER DRAINAGE CONTROL

SITE INFORMATION

August 05, 2024

Street Address: 80 Haverhill Road Town: Amesbury State: Massachusetts Zip Code: 01913 County: Essex
Land Use: Residential Latitude: ~42° 50' 31.90" N Longitude: ~70° 57' 03.70" W

PUBLISHED SOIL DATA AND MAP UNIT DESCRIPTION

Physiographic Division: Appalachian Highlands Physio. Province: New England Physio. Section: Seaboard lowland section
Soil survey area: Essex County, Massachusetts, Northern Part Series name: 256A Deerfield LS, 0-3% slopes
Order: Entisol Suborder: Psamments Family: Mixed, mesic, Aquic Udipsamments
Soil moisture regime: Udic Soil temperature regime: Mesic Runoff class: Negligible Hydric soil rating: No
Soil hydric or upland? Upland Average depth to water table: About 15"- 37" Depth to restrictive feature: > 80"
Frequency of flooding: None Frequency of ponding: None Available water capacity: Moderate (~6.5")
Drainage Class: Moderately well drained Hydrologic Soil Group: A Ksat: Moderately high to very high (1.42 – 99.90 in/hr)
Ecological site: Moist sandy Outwash

WETLAND AREA & USGS WELL MEASUREMENTS

National Wetland Inventory Map: NA Wetlands Conservancy Program: NA Bordering vegetative wetland: NA
Current Water Resource Condition (USGS): Well Site # 424841071004101- MA-HLW 23 Haverhill, MA.,
Well depth: 15.10 feet Land surface altitude: 100.00 feet above NGVD29 Latitude: ~42°48'41.8" N Longitude: ~71°00'41.7"
Most recent data value: 13.47' on 08/05/24 (depth to water level in feet below land surface)

SURFICIAL GEOLOGY:

Geologic parent material: Glaciofluvial sandy deposits Geomorphic component: Outwash terrace
Slope aspect: Level Landform position (2D): Flat Landform position (3D): Tread
Slope gradient: ~00-03% Down slope shape: Convex Across slope shape: Linear Slope complexity: Simple
Bedrock outcropping in vicinity: None observed Glacial erratics in vicinity: None observed
Bedrock Type: Eliot Formation: Phyllite and calcareous phyllite. Consists of gray to green phyllite, calcareous quartzite, quartz-mica schist, and well-bedded calc-silicate.

TP24-1 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-1

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00” → 89”	^C	Sandy Loam fill mixture	10YR 4/1 dark gray	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 89” Seasonal High Groundwater Table: ____ Apparent water: ____

TP24-1 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 0.00'

Depth of naturally occurring pervious material in TP24-1 Upper boundary: 00"
Lower boundary: 00"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-2 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-2

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 40''	A _C	Sandy Loam fill mixture	10YR 4/4 dark yellowish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; abrupt wavy boundary.
40'' → 95''	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 20-25% sub-angular to sub-rounded gravel and 10% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; well graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 95''

Seasonal High Groundwater Table:

Apparent water:

TP24-2 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 4.58'

Depth of naturally occurring pervious material in TP24-2 Upper boundary: 40"
Lower boundary: 95"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-3 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-3

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00” → 93”	^C	Sandy Loam fill mixture	10YR 4/4 dark yellowish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 93” Seasonal High Groundwater Table: ____ Apparent water: ____

TP24-3 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 0.00'

Depth of naturally occurring pervious material in TP24-3 Upper boundary: 00"
Lower boundary: 00"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-4 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10+ feet Drainage way: 50+ feet Drinking water well: 100+ feet Abutting septic system: 50+ feet

Wetlands: 50+ feet Public water supply reservoir: 400+ feet Tributary to reservoir: 200+ feet

SOIL PROFILE ► TP24-4

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 08"	A	Sandy Loam fine	10YR 3/2 very dark brown	none observed	Very friable; moderate-grade fine to medium granular structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine roots; clear wavy boundary.
08" → 85"	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 20-25% sub-angular to sub-rounded gravel and 10% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; well graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 85"

Seasonal High Groundwater Table: ____

Apparent water: ____

TP24-4 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 6.42'

Depth of naturally occurring pervious material in TP24-4 Upper boundary: 08"
Lower boundary: 85"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-5 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-5

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 08''	A	Sandy Loam fine	10YR 3/2 very dark brown	none observed	Very friable; moderate-grade fine to medium granular structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine roots; clear wavy boundary.
08'' → 92''	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 20-25% sub-angular to sub-rounded gravel and 10% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; well graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 92'' Seasonal High Groundwater Table: Apparent water:

TP24-5 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 7.00'

Depth of naturally occurring pervious material in TP24-5 Upper boundary: 08"
Lower boundary: 92"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-6 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-6

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 07''	A	Sandy Loam fine	10YR 3/2 very dark brown	none observed	Very friable; moderate-grade fine to medium granular structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine roots; clear wavy boundary.
07'' → 95''	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 20-25% sub-angular to sub-rounded gravel and 10% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; well graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 95'' Seasonal High Groundwater Table: Apparent water:

TP24-6 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 7.33'

Depth of naturally occurring pervious material in TP24-6 Upper boundary: 07"
Lower boundary: 95"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-7 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-7

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 26''	A _C	Sandy Loam fill mixture	10YR 4/4 dark yellowish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; abrupt wavy boundary.
26'' → 85''	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 20-25% sub-angular to sub-rounded gravel and 10% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; well graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 85'' Seasonal High Groundwater Table: Apparent water:

TP24-7 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 4.92'

Depth of naturally occurring pervious material in TP24-7 Upper boundary: 26"
Lower boundary: 85"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-8 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-8

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 21''	A _C	Sandy Loam fill mixture	10YR 4/4 dark yellowish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; abrupt wavy boundary.
21'' → 78''	2C	Loamy Fine Sand	2.5Y 6/8 olive yellow	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; free of clasts; non-sticky; non-plastic; well graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 78'' Seasonal High Groundwater Table: Apparent water:

TP24-8 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 4.75'

Depth of naturally occurring pervious material in TP24-8 Upper boundary: 21"
Lower boundary: 78"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-9 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-9

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 28''	A _C	Sandy Loam fill mixture	10YR 4/4 dark yellowish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; abrupt wavy boundary.
28'' → 82''	2C	Loamy Fine Sand	2.5Y 6/8 olive yellow	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 82''

Seasonal High Groundwater Table:

Apparent water:

TP24-9 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 4.50'

Depth of naturally occurring pervious material in TP24-9 Upper boundary: 28"
Lower boundary: 82"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-10 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: August 05, 2024 Weather: Clear, 75°-80° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 03% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-10

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 10''	A	Sandy Loam fine	10YR 3/2 very dark brown	none observed	Very friable; moderate-grade fine to medium granular structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine roots; clear wavy boundary.
10'' → 14''	B _w	Sandy Loam	10YR 4/6 dark yellowish brown	none observed	Very friable; massive structure; non-cohesive; fine-grained mineral content; damp; non-sticky; non-plastic; few roots; approximately 3-5% sub-angular to sub-rounded gravel content of mixed lithology; clear wavy boundary.
14'' → 80''	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	none observed	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 80''

Seasonal High Groundwater Table:

Apparent water:

TP24-10 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: ____ (below land surface)

Kind: _____

Shape: _____ Location: _____

Hardness: ____ Boundary: ____ Abundance: ____ Size: ____ Contrast: ____

Concentration color: ____ Reduction color: ____ Moisture state: Dry

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: ____ (below land surface) Depth to stabilized apparent water: ____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: ____ inches below grade

Observed water weeping from side of deep hole: ____ inches below grade

Observed depth to stabilized phreatic water: ____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 5.83'

Depth of naturally occurring pervious material in TP24-10 Upper boundary: 10"

Lower boundary: 80"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

08/05/24

Date of soil testing

TP24-11 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: September 30, 2024 Weather: Clear, 65°-70° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 02% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-11

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00” → 13”	[^] C	Sandy Loam fill mixture	10YR 4/2 dark grayish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.
13” → 129”	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	101” (c,2,p) 5YR 5/8 10YR 7/1	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; redoximorphic features observed at 101”; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 129”

Seasonal High Groundwater Table: 101”

Apparent water: >129

TP24-11 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: 101" (below land surface)

Kind: Iron concentrations; non-cemented iron masses surrounded by reduction halos

Shape: Amorphous/ spherical Location: In 2C matrix

Hardness: Soft Boundary: Diffuse Abundance: Common Size: Medium Contrast: Prominent

Concentration color: 5YR 5/8 yellowish red Reduction color: 10YR 7/1 light gray Moisture state: Dry matrix

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: _____ (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 101" inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to stabilized phreatic water: _____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 9.66'

Depth of naturally occurring pervious material in TP24-11 Upper boundary: 13"
Lower boundary: 129"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

09/30/24

Date of soil testing

TP24-12 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: September 30, 2024 Weather: Clear, 65°-70° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 02% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-12

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 15"	[^] C	Sandy Loam fill mixture	10YR 4/2 dark grayish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.
15" → 127"	₂ C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	100" (c,2,p) 5YR 5/8 10YR 7/1	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; redoximorphic features observed at 100"; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 127"

Seasonal High Groundwater Table: 100"

Apparent water: >127"

TP24-12 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: 100" (below land surface)

Kind: Iron concentrations; non-cemented iron masses surrounded by reduction halos

Shape: Amorphous/ spherical Location: In 2C matrix

Hardness: Soft Boundary: Diffuse Abundance: Common Size: Medium Contrast: Prominent

Concentration color: 5YR 5/8 yellowish red Reduction color: 10YR 7/1 light gray Moisture state: Dry matrix

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: _____ (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to stabilized phreatic water: _____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 9.66'

Depth of naturally occurring pervious material in TP24-12 Upper boundary: 13"
Lower boundary: 129"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

09/30/24

Date of soil testing

TP24-13 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: September 30, 2024 Weather: Clear, 65°-70° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 02% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-13

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 16"	[^] C	Sandy Loam fill mixture	10YR 4/2 dark grayish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.
16" → 127"	₂ C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	110" (c,2,p) 5YR 5/8 10YR 7/1	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; redoximorphic features observed at 110"; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 127"

Seasonal High Groundwater Table: 110"

Apparent water: >127"

TP24-13 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: 100" (below land surface)

Kind: Iron concentrations; non-cemented iron masses surrounded by reduction halos

Shape: Amorphous/ spherical Location: In 2C matrix

Hardness: Soft Boundary: Diffuse Abundance: Common Size: Medium Contrast: Prominent

Concentration color: 5YR 5/8 yellowish red Reduction color: 10YR 7/1 light gray Moisture state: Dry matrix

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: _____ (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to stabilized phreatic water: _____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 9.66'

Depth of naturally occurring pervious material in TP24-13 Upper boundary: 13"
Lower boundary: 129"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

09/30/24

Date of soil testing

TP24-14 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: September 30, 2024 Weather: Clear, 65°-70° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 01% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-14

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 20"	[^] C	Sandy Loam fill mixture	10YR 4/2 dark grayish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.
20" → 127"	₂ C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	90" (c,2,p) 5YR 5/8 10YR 7/1	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; redoximorphic features observed at 90"; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 127"

Seasonal High Groundwater Table: 90"

Apparent water: >127"

TP24-14 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: 90" (below land surface)

Kind: Iron concentrations; non-cemented iron masses surrounded by reduction halos

Shape: Amorphous/ spherical Location: In 2C matrix

Hardness: Soft Boundary: Diffuse Abundance: Common Size: Medium Contrast: Prominent

Concentration color: 5YR 5/8 yellowish red Reduction color: 10YR 7/1 light gray Moisture state: Dry matrix

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: _____ (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 90" inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to stabilized phreatic water: _____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 8.92'

Depth of naturally occurring pervious material in TP24-14 Upper boundary: 20"

Lower boundary: 127"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

June 1998

Evaluator & license number Certification

Date of Soil Evaluator Certification

Unofficial soils for drainage

09/30/24

Amesbury Town Witness

Date of soil testing

TP24-15 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: September 30, 2024 Weather: Clear, 65°-70° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 01% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-15

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00'' → 20''	[^] C	Sandy Loam fill mixture	10YR 4/2 dark grayish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.
20'' → 127''	₂ C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	92'' (c,2,p) 5YR 5/8 10YR 7/1	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; redoximorphic features observed at 92''; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 127''

Seasonal High Groundwater Table: 92''

Apparent water: >127

TP24-15 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: 92" (below land surface)

Kind: Iron concentrations; non-cemented iron masses surrounded by reduction halos

Shape: Amorphous/ spherical Location: In 2C matrix

Hardness: Soft Boundary: Diffuse Abundance: Common Size: Medium Contrast: Prominent

Concentration color: 5YR 5/8 yellowish red Reduction color: 10YR 7/1 light gray Moisture state: Dry matrix

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: _____ (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 90" inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to stabilized phreatic water: _____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 8.92'

Depth of naturally occurring pervious material in TP24-15 Upper boundary: 20"

Lower boundary: 127"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

June 1998

Evaluator & license number Certification

Date of Soil Evaluator Certification

Unofficial soils for drainage

09/30/24

Amesbury Town Witness

Date of soil testing

TP24-16 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

Date: September 30, 2024 Weather: Clear, 65°-70° F, still and dry.

Landscape: Upland Landform: Outwash terrace Position on landscape: Tread

Slope aspect: Level Slope (%): 00 – 01% Slope complexity: Simple Land Cover: Grass lawn

Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet Abutting septic system: 50⁺ feet

Wetlands: 50⁺ feet Public water supply reservoir: 400⁺ feet Tributary to reservoir: 200⁺ feet

SOIL PROFILE ► TP24-16

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00” → 28”	[^] C	Sandy Loam fill mixture	10YR 4/2 dark grayish brown	none observed	Friable; moderate-grade fine to medium blocky structure; somewhat cohesive; fine grained mineral content; dry matrix; non-sticky; non-plastic; free of clasts; common fine-to-medium roots; non-sticky; non-plastic; poorly graded; no redoximorphic features observed; no apparent water observed; no bedrock refusal at test hole depth.
28” → 124”	2C	Loamy Fine Sand gravelly	2.5Y 6/3 light yellowish brown	90” (c,2,p) 5YR 5/8 10YR 7/1	Loose; single grained/ structureless; unstable; non-cohesive; stratified; medium-to-fine grained mineral content; slightly damp matrix; non-sticky; non-plastic; no observed indications of a seasonal high-water table; approximately 05-10% sub-angular to sub-rounded gravel and 05% sub-rounded to angular cobble content of mixed lithology; non-sticky; non-plastic; poorly graded; redoximorphic features observed at 90”; no apparent water observed; no bedrock refusal at test hole depth.

Depth to bedrock: > 127”

Seasonal High Groundwater Table: 90”

Apparent water: >127

TP24-16 DEEP OBSERVATION HOLE

80 Haverhill Road, Amesbury, Massachusetts

ESTIMATED SEASONAL GROUNDWATER TABLE

Depth of Estimated Seasonal High Groundwater Table: 90" (below land surface)

Kind: Iron concentrations; non-cemented iron masses surrounded by reduction halos

Shape: Amorphous/ spherical Location: In 2C matrix

Hardness: Soft Boundary: Diffuse Abundance: Common Size: Medium Contrast: Prominent

Concentration color: 5YR 5/8 yellowish red Reduction color: 10YR 7/1 light gray Moisture state: Dry matrix

DEPTH TO PHREATIC GROUNDWATER TABLE

Apparent water seeping from pit face: _____ (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: dry

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 90" inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to stabilized phreatic water: _____ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL ► 8.00'

Depth of naturally occurring pervious material in TP24-16 Upper boundary: 28"
Lower boundary: 124"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Evaluator & license number Certification

Unofficial soils for drainage

Amesbury Town Witness

June 1998

Date of Soil Evaluator Certification

09/30/24

Date of soil testing

IIX. Appendix

a. Pipe Sizing Calculations

PIPE VELOCITY CALCULATIONS-10 YEAR STORM

MEI

Millennium Engineering, Inc.

Pipe Sizing Calculation Spreadsheet:

Name: 80 Haverhill Road

Location: 80 Haverhill Road
Amesbury, MA

Job No.: M234276

Date: 1/21/2025

Revised:

Design Parameters:

25

Year Storm

IDF Curve

Boston

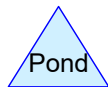
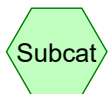
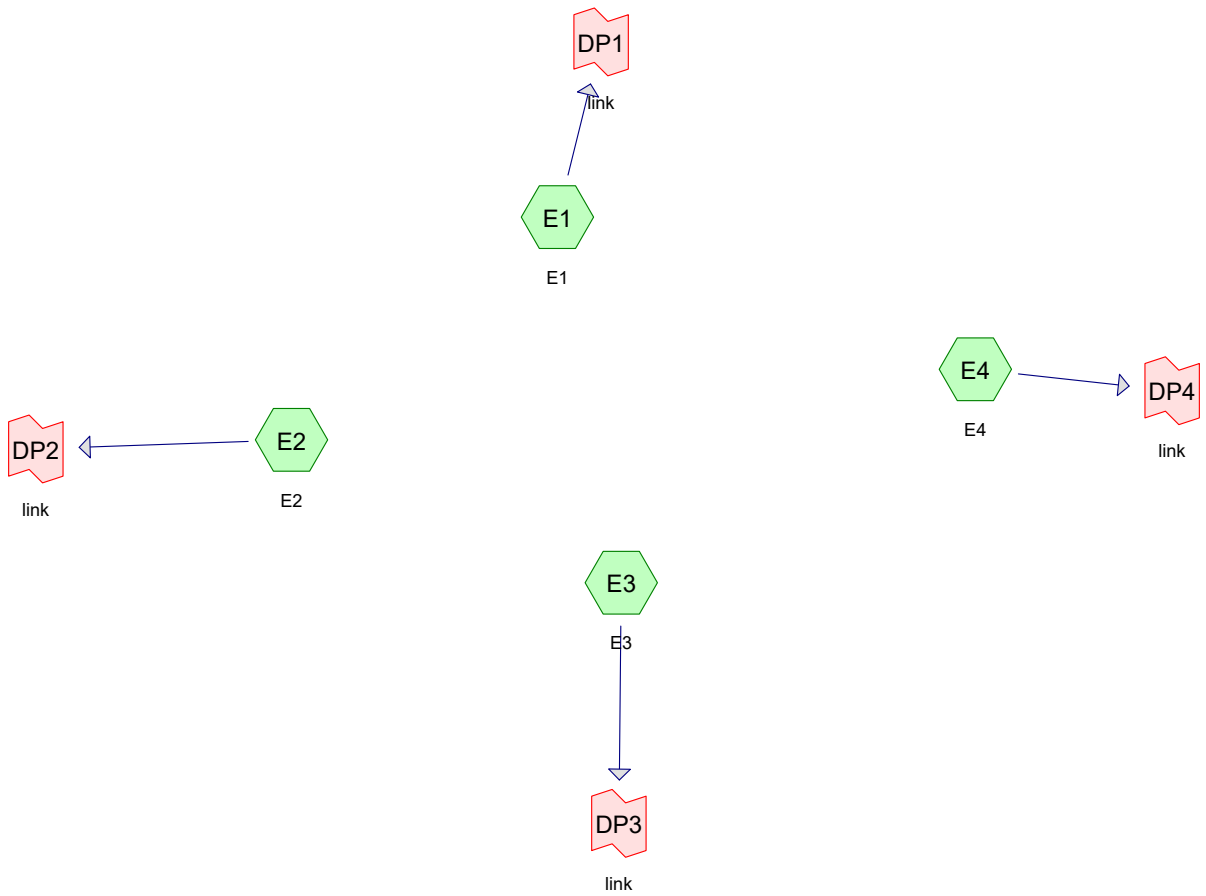
MA

k_s=

0.2

DESCRIPTION	LOCATION		AREA (AC.)	C	C x A	SUM C x A	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PIPE PROFILE				
	FROM	TO					PIPE	CONC. TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER
CB-1	CB-1	DMH-1	0.02	0.35	0.01	0.01	0.14	2.0	6.2	0.0	0.8	0.013	12	0.007	3.0	3.8	7	0.05	122.15	119.15	119.10
CB-2	CB-2	DMH-1	0.03	0.90	0.03	0.03	0.08	2.0	6.2	0.2	1.5	0.013	12	0.007	3.0	3.8	7	0.05	122.15	119.15	119.10
DMH-1	DMH-1	INF 1			0.00	0.03	0.27	2.1	6.2	0.2	1.3	0.013	12	0.005	2.4	3.1	22	0.10	122.50	119.00	118.90
CB-3	CB-3	DMH-2	0.05	0.83	0.04	0.04	0.19	2.0	6.2	0.2	1.7	0.013	12	0.007	2.9	3.7	20	0.13	118.50	114.73	114.60
CB-4	CB-4	DMH-2	0.14	0.78	0.11	0.11	0.09	2.0	6.2	0.7	2.5	0.013	12	0.007	3.0	3.8	14	0.10	117.40	114.70	114.60
DMH-2	DMH-2	INF 2			0.00	0.17	0.02	2.2	6.1	1.1	2.2	0.013	12	0.003	2.1	2.6	3	0.01	117.56	114.51	114.50

b. Existing Conditions HydroCAD Report



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Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4258 MA Salisbury Essex County

Rainfall events imported from "EX. CON. 8-30-23.hcp"

Rainfall events imported from "Atlas-14-Rain.txt" for 440 MA Essex

Rainfall events imported from "Atlas-14-Rain.txt" for 440 MA Essex

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.15	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.83	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.16	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.94	2

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
16,801	39	>75% Grass cover, Good, HSG A (E1, E2, E3, E4)
6,845	96	Gravel surface, HSG A (E1, E2, E3, E4)
523	98	Roofs, HSG A (E3)
3,164	98	Unconnected roofs, HSG A (E1, E2)
27,333	61	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
27,333	HSG A	E1, E2, E3, E4
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
27,333		TOTAL AREA

PRE

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
16,801	0	0	0	0	16,801	>75% Grass cover, Good
6,845	0	0	0	0	6,845	Gravel surface
523	0	0	0	0	523	Roofs
3,164	0	0	0	0	3,164	Unconnected roofs
27,333	0	0	0	0	27,333	TOTAL AREA

Sub
Num

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Type III 24-hr 2-Year Rainfall=3.15"

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

Subcatchment E1: E1	Runoff Area=7,632 sf 12.57% Impervious Runoff Depth>0.70" Tc=6.0 min UI Adjusted CN=68 Runoff=0.12 cfs 448 cf
Subcatchment E2: E2	Runoff Area=14,039 sf 15.71% Impervious Runoff Depth>0.14" Tc=6.0 min UI Adjusted CN=51 Runoff=0.01 cfs 162 cf
Subcatchment E3: E3	Runoff Area=4,679 sf 11.18% Impervious Runoff Depth>0.80" Tc=6.0 min CN=70 Runoff=0.09 cfs 311 cf
Subcatchment E4: E4	Runoff Area=983 sf 0.00% Impervious Runoff Depth>0.05" Tc=6.0 min CN=46 Runoff=0.00 cfs 4 cf
Link DP1: link	Inflow=0.12 cfs 448 cf Primary=0.12 cfs 448 cf
Link DP2: link	Inflow=0.01 cfs 162 cf Primary=0.01 cfs 162 cf
Link DP3: link	Inflow=0.09 cfs 311 cf Primary=0.09 cfs 311 cf
Link DP4: link	Inflow=0.00 cfs 4 cf Primary=0.00 cfs 4 cf

Total Runoff Area = 27,333 sf Runoff Volume = 926 cf Average Runoff Depth = 0.41"
86.51% Pervious = 23,646 sf 13.49% Impervious = 3,687 sf

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Type III 24-hr 2-Year Rainfall=3.15"

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Summary for Subcatchment E1: E1

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 448 cf, Depth> 0.70"
Routed to Link DP1 : link

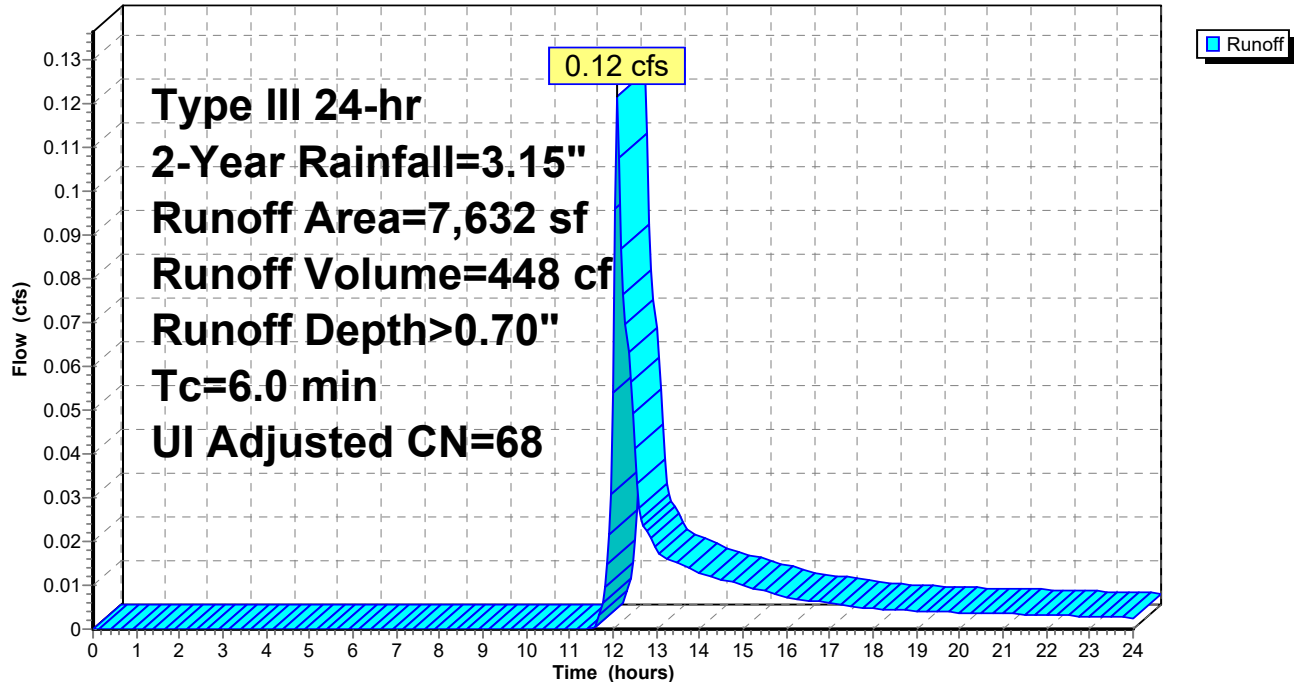
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Adj	Description
959	98		Unconnected roofs, HSG A
3,103	96		Gravel surface, HSG A
3,570	39		>75% Grass cover, Good, HSG A
7,632	70	68	Weighted Average, UI Adjusted
6,673			87.43% Pervious Area
959			12.57% Impervious Area
959			100.00% Unconnected

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

Subcatchment E1: E1

Hydrograph



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Summary for Subcatchment E2: E2

Runoff = 0.01 cfs @ 12.45 hrs, Volume= 162 cf, Depth> 0.14"
Routed to Link DP2 : link

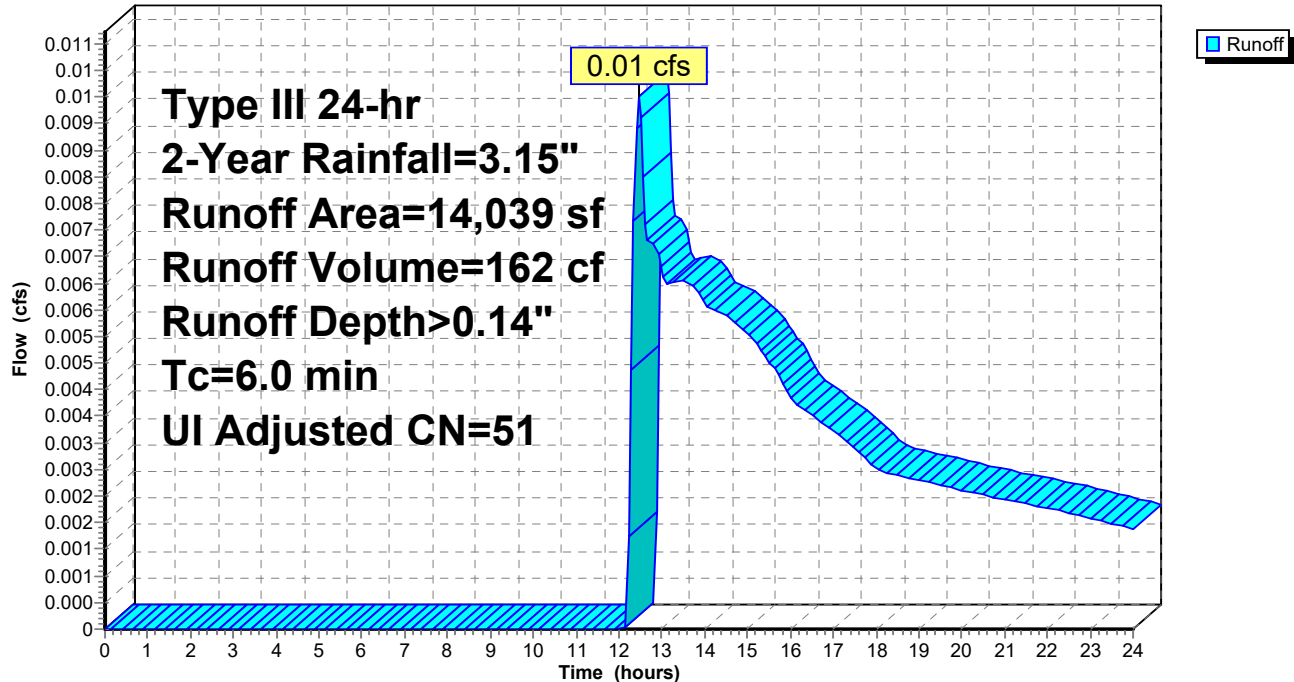
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Adj	Description
2,205	98		Unconnected roofs, HSG A
1,666	96		Gravel surface, HSG A
10,168	39		>75% Grass cover, Good, HSG A
14,039	55	51	Weighted Average, UI Adjusted
11,834			84.29% Pervious Area
2,205			15.71% Impervious Area
2,205			100.00% Unconnected

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

Subcatchment E2: E2

Hydrograph



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Summary for Subcatchment E3: E3

Runoff = 0.09 cfs @ 12.10 hrs, Volume= 311 cf, Depth> 0.80"
Routed to Link DP3 : link

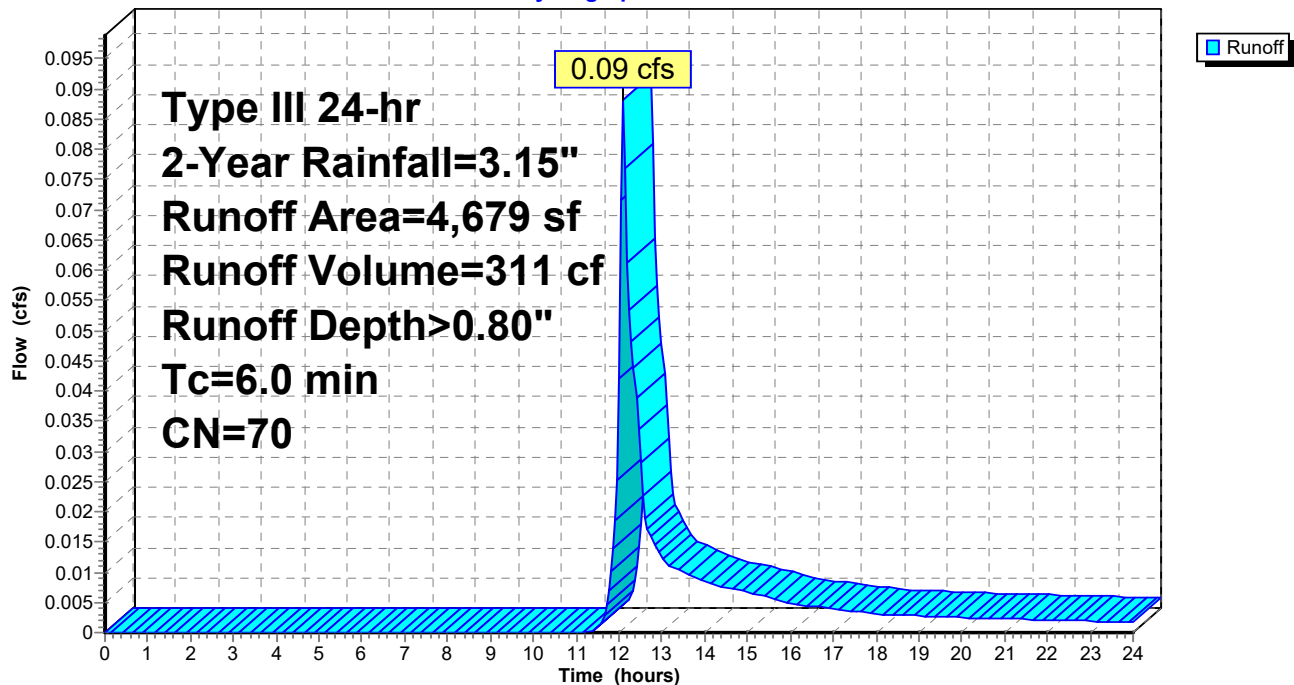
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
523	98	Roofs, HSG A
1,963	96	Gravel surface, HSG A
2,193	39	>75% Grass cover, Good, HSG A
4,679	70	Weighted Average
4,156		88.82% Pervious Area
523		11.18% Impervious Area

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

Subcatchment E3: E3

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Type III 24-hr 2-Year Rainfall=3.15"

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Summary for Subcatchment E4: E4

Runoff = 0.00 cfs @ 15.17 hrs, Volume= 4 cf, Depth> 0.05"
Routed to Link DP4 : link

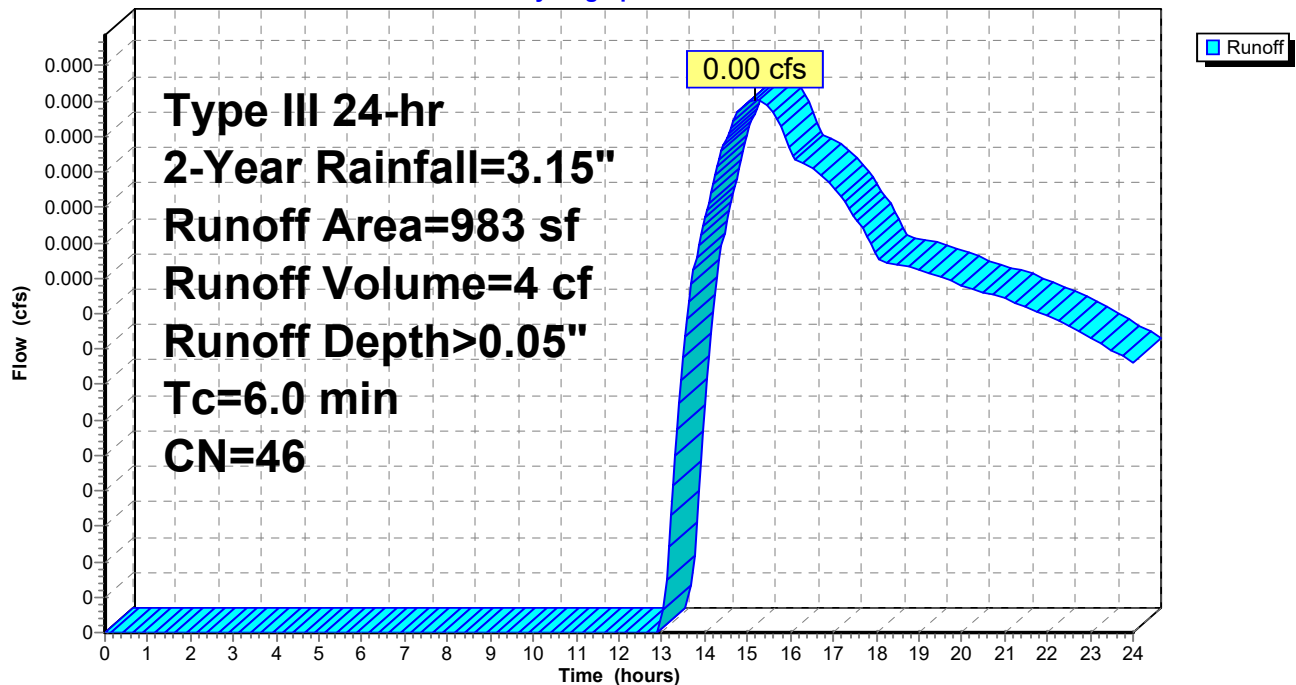
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
113	96	Gravel surface, HSG A
870	39	>75% Grass cover, Good, HSG A
983	46	Weighted Average
983		100.00% Pervious Area

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

Subcatchment E4: E4

Hydrograph



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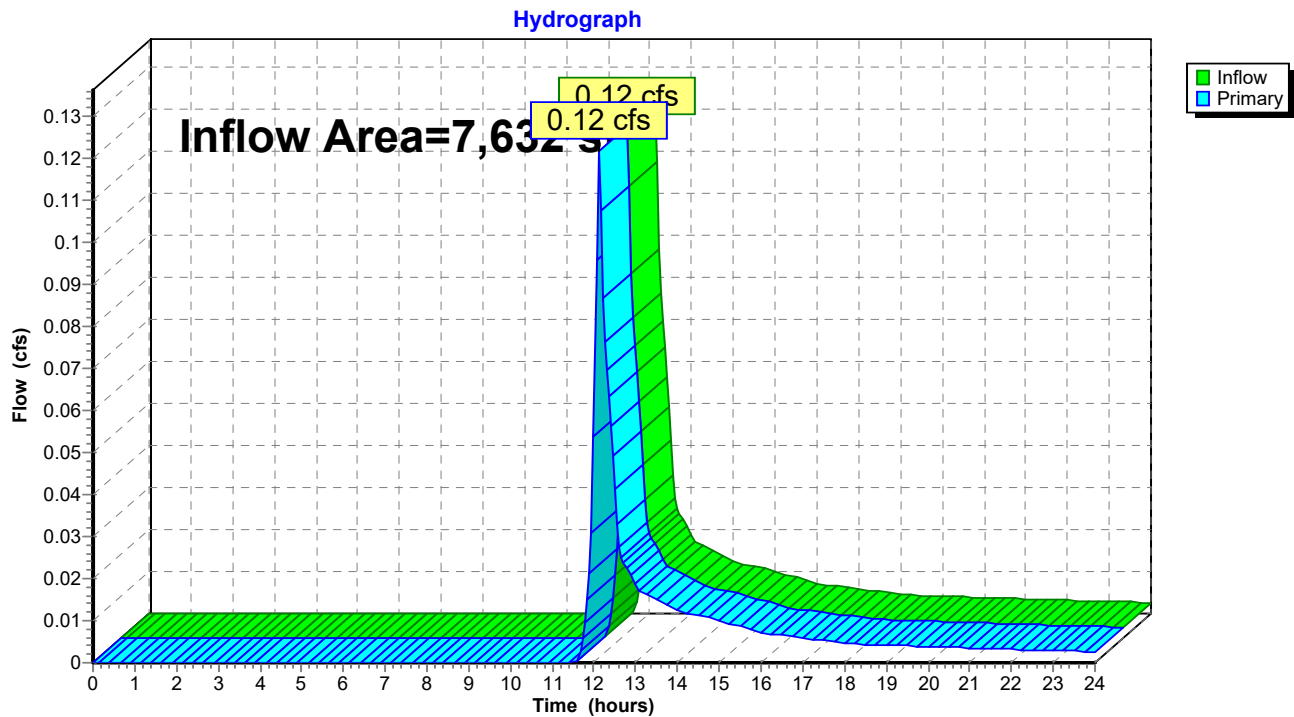
Page 12

Summary for Link DP1: link

Inflow Area = 7,632 sf, 12.57% Impervious, Inflow Depth > 0.70" for 2-Year event
Inflow = 0.12 cfs @ 12.11 hrs, Volume= 448 cf
Primary = 0.12 cfs @ 12.11 hrs, Volume= 448 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link



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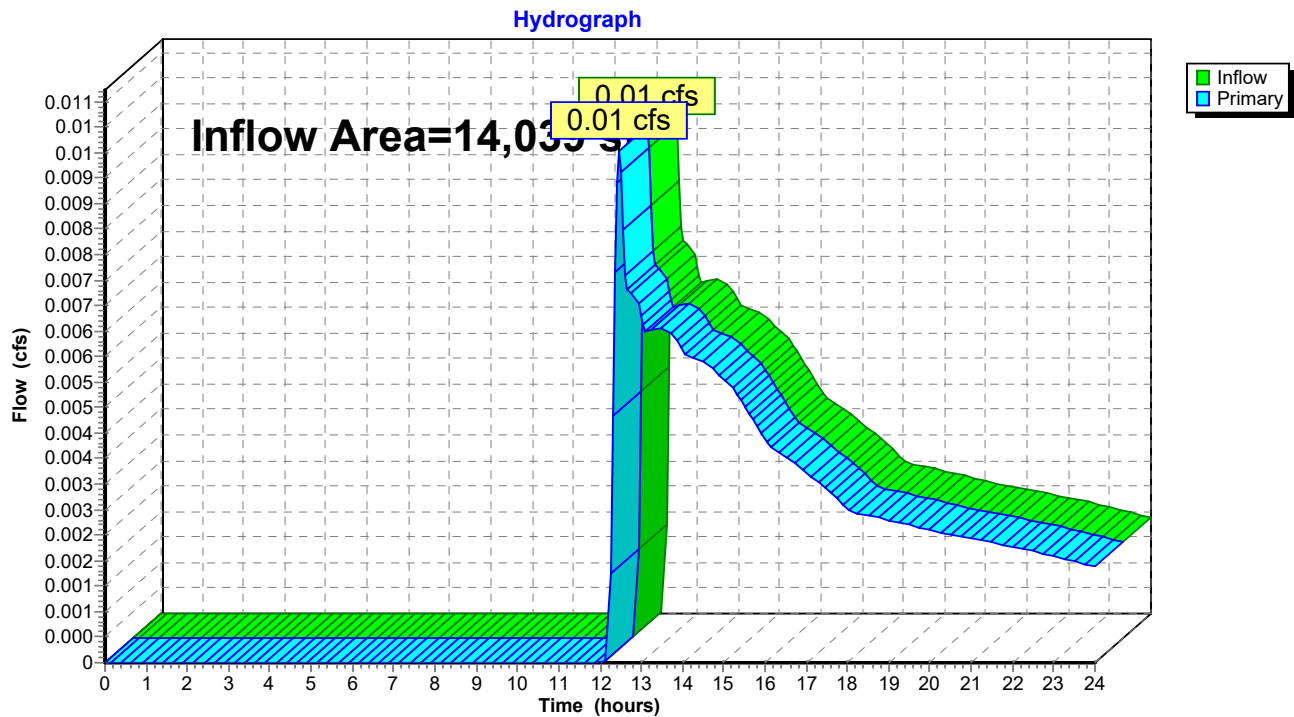
Page 13

Summary for Link DP2: link

Inflow Area = 14,039 sf, 15.71% Impervious, Inflow Depth > 0.14" for 2-Year event
Inflow = 0.01 cfs @ 12.45 hrs, Volume= 162 cf
Primary = 0.01 cfs @ 12.45 hrs, Volume= 162 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link



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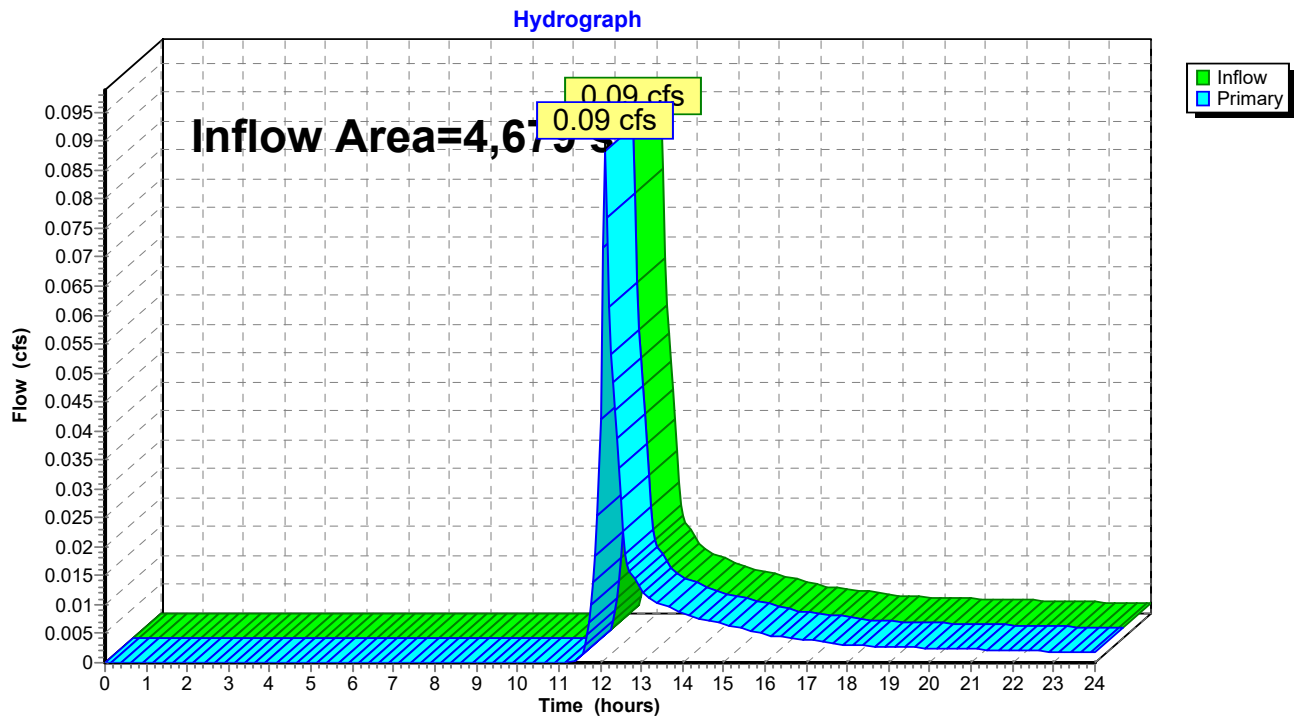
Page 14

Summary for Link DP3: link

Inflow Area = 4,679 sf, 11.18% Impervious, Inflow Depth > 0.80" for 2-Year event
Inflow = 0.09 cfs @ 12.10 hrs, Volume= 311 cf
Primary = 0.09 cfs @ 12.10 hrs, Volume= 311 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP3: link



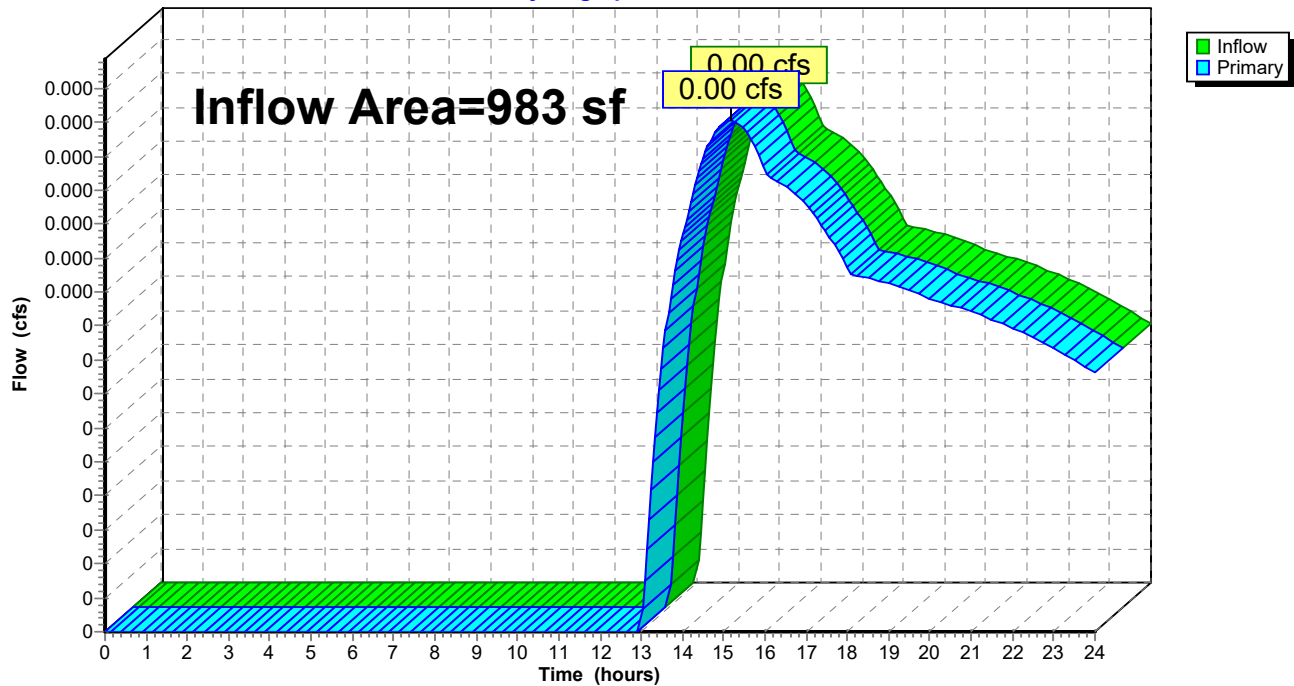
Summary for Link DP4: link

Inflow Area = 983 sf, 0.00% Impervious, Inflow Depth > 0.05" for 2-Year event
Inflow = 0.00 cfs @ 15.17 hrs, Volume= 4 cf
Primary = 0.00 cfs @ 15.17 hrs, Volume= 4 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

Hydrograph



PRE*Type III 24-hr 10-Year Rainfall=4.83"*

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

Subcatchment E1: E1	Runoff Area=7,632 sf 12.57% Impervious Runoff Depth>1.76" Tc=6.0 min UI Adjusted CN=68 Runoff=0.34 cfs 1,118 cf
Subcatchment E2: E2	Runoff Area=14,039 sf 15.71% Impervious Runoff Depth>0.67" Tc=6.0 min UI Adjusted CN=51 Runoff=0.15 cfs 789 cf
Subcatchment E3: E3	Runoff Area=4,679 sf 11.18% Impervious Runoff Depth>1.91" Tc=6.0 min CN=70 Runoff=0.23 cfs 744 cf
Subcatchment E4: E4	Runoff Area=983 sf 0.00% Impervious Runoff Depth>0.43" Tc=6.0 min CN=46 Runoff=0.00 cfs 35 cf
Link DP1: link	Inflow=0.34 cfs 1,118 cf Primary=0.34 cfs 1,118 cf
Link DP2: link	Inflow=0.15 cfs 789 cf Primary=0.15 cfs 789 cf
Link DP3: link	Inflow=0.23 cfs 744 cf Primary=0.23 cfs 744 cf
Link DP4: link	Inflow=0.00 cfs 35 cf Primary=0.00 cfs 35 cf

Total Runoff Area = 27,333 sf Runoff Volume = 2,687 cf Average Runoff Depth = 1.18"
86.51% Pervious = 23,646 sf 13.49% Impervious = 3,687 sf

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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment E1: E1

Runoff = 0.34 cfs @ 12.10 hrs, Volume= 1,118 cf, Depth> 1.76"
Routed to Link DP1 : link

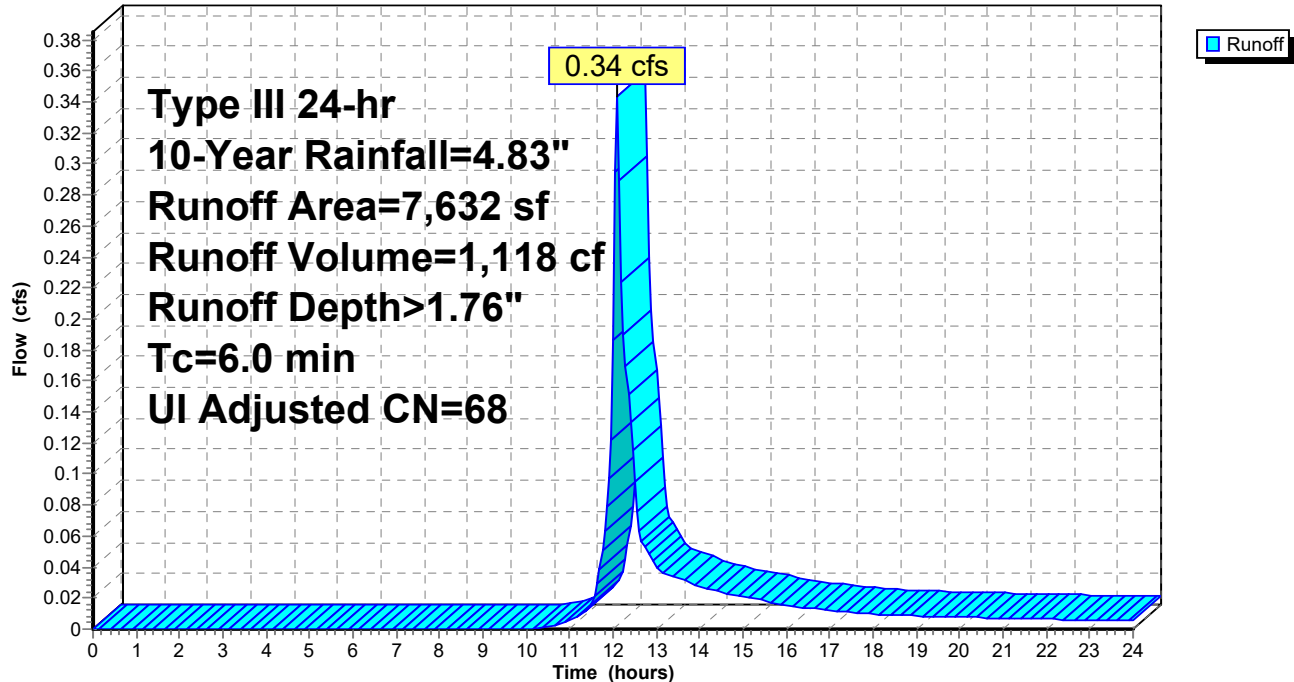
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Adj	Description
959	98		Unconnected roofs, HSG A
3,103	96		Gravel surface, HSG A
3,570	39		>75% Grass cover, Good, HSG A
7,632	70	68	Weighted Average, UI Adjusted
6,673			87.43% Pervious Area
959			12.57% Impervious Area
959			100.00% Unconnected

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

Subcatchment E1: E1

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment E2: E2

Runoff = 0.15 cfs @ 12.13 hrs, Volume= 789 cf, Depth> 0.67"
Routed to Link DP2 : link

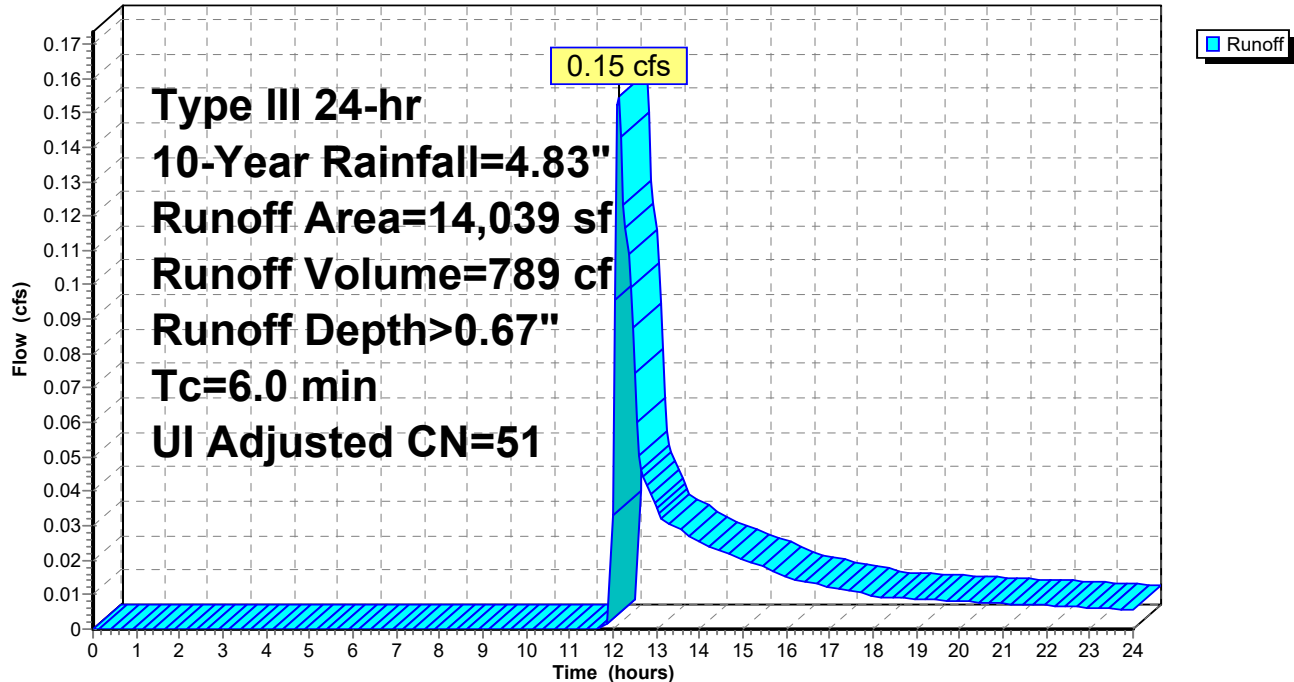
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Adj	Description
2,205	98		Unconnected roofs, HSG A
1,666	96		Gravel surface, HSG A
10,168	39		>75% Grass cover, Good, HSG A
14,039	55	51	Weighted Average, UI Adjusted
11,834			84.29% Pervious Area
2,205			15.71% Impervious Area
2,205			100.00% Unconnected

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

Subcatchment E2: E2

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment E3: E3

Runoff = 0.23 cfs @ 12.10 hrs, Volume= 744 cf, Depth> 1.91"
Routed to Link DP3 : link

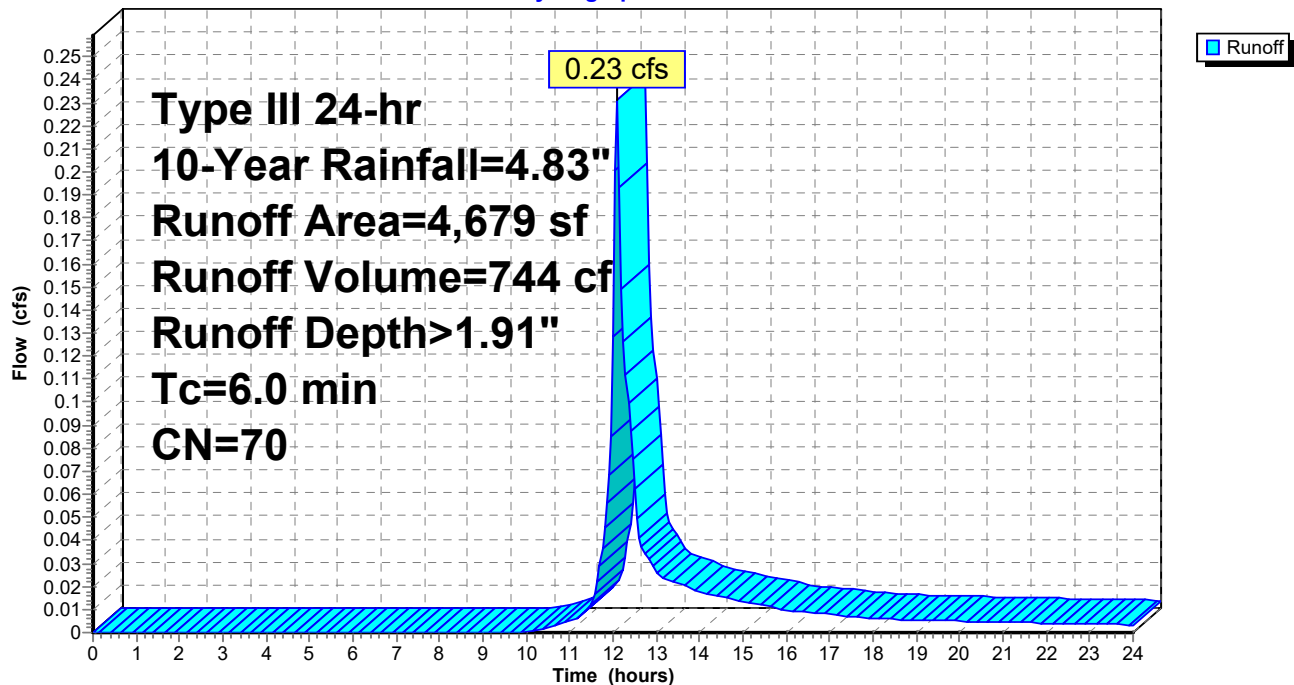
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
523	98	Roofs, HSG A
1,963	96	Gravel surface, HSG A
2,193	39	>75% Grass cover, Good, HSG A
4,679	70	Weighted Average
4,156		88.82% Pervious Area
523		11.18% Impervious Area

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

Subcatchment E3: E3

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment E4: E4

Runoff = 0.00 cfs @ 12.30 hrs, Volume= 35 cf, Depth> 0.43"
Routed to Link DP4 : link

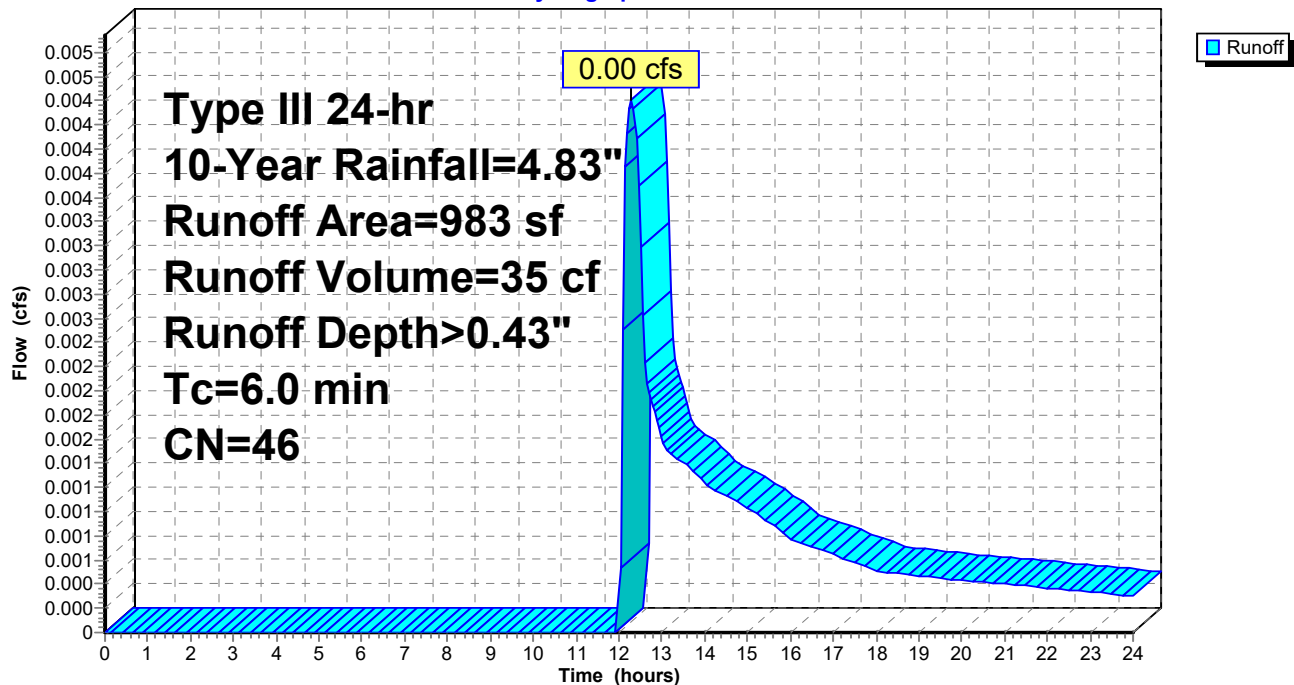
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
113	96	Gravel surface, HSG A
870	39	>75% Grass cover, Good, HSG A
983	46	Weighted Average
983		100.00% Pervious Area

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

Subcatchment E4: E4

Hydrograph



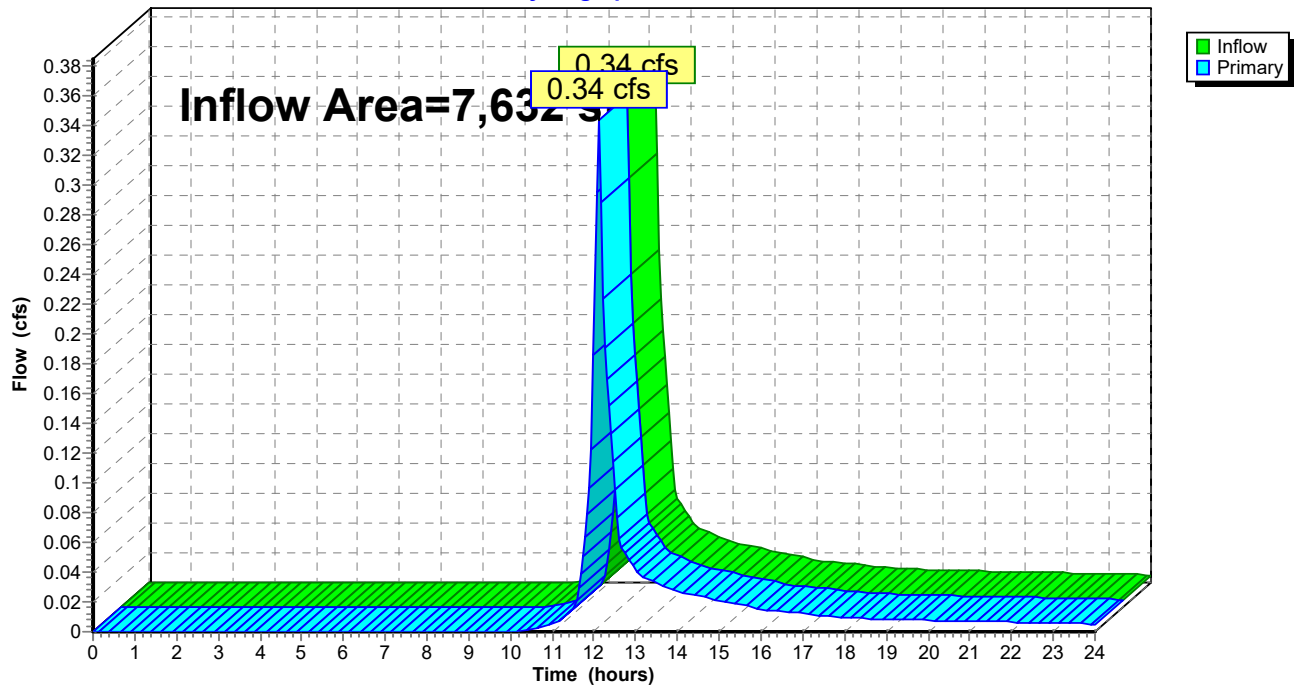
Summary for Link DP1: link

Inflow Area = 7,632 sf, 12.57% Impervious, Inflow Depth > 1.76" for 10-Year event
Inflow = 0.34 cfs @ 12.10 hrs, Volume= 1,118 cf
Primary = 0.34 cfs @ 12.10 hrs, Volume= 1,118 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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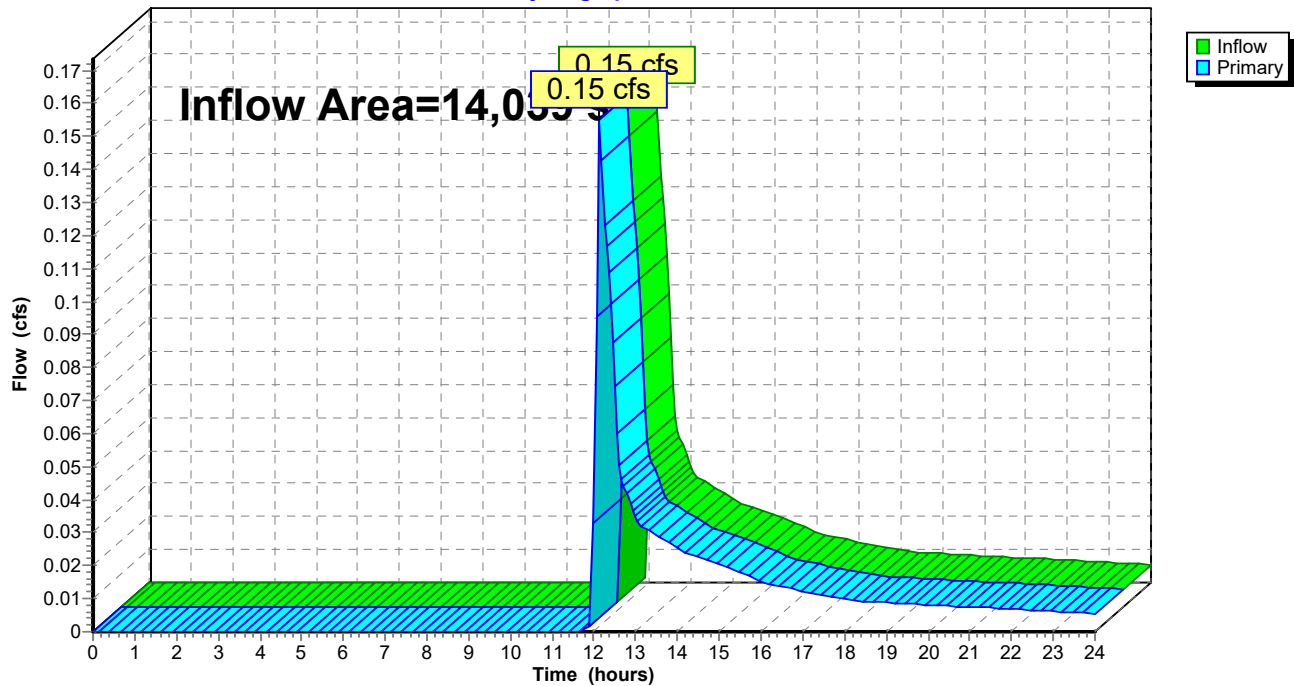
Summary for Link DP2: link

Inflow Area = 14,039 sf, 15.71% Impervious, Inflow Depth > 0.67" for 10-Year event
Inflow = 0.15 cfs @ 12.13 hrs, Volume= 789 cf
Primary = 0.15 cfs @ 12.13 hrs, Volume= 789 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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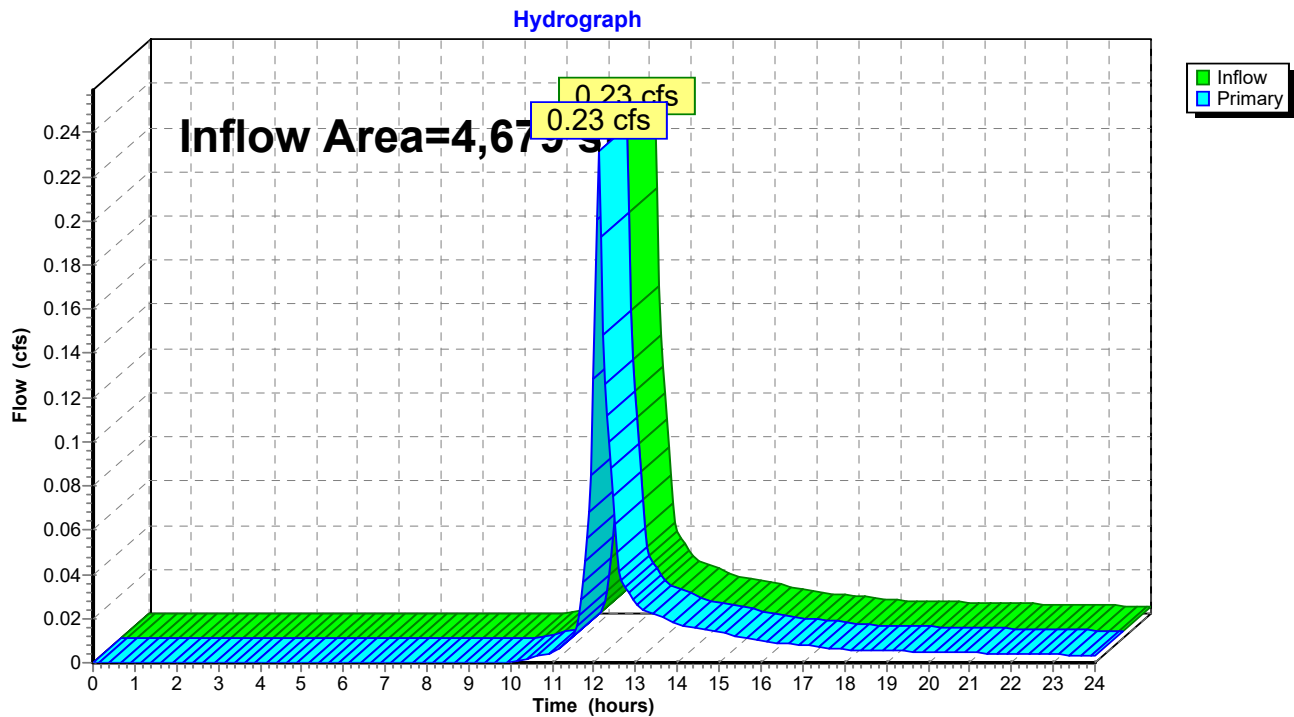
Page 23

Summary for Link DP3: link

Inflow Area = 4,679 sf, 11.18% Impervious, Inflow Depth > 1.91" for 10-Year event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 744 cf
Primary = 0.23 cfs @ 12.10 hrs, Volume= 744 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP3: link



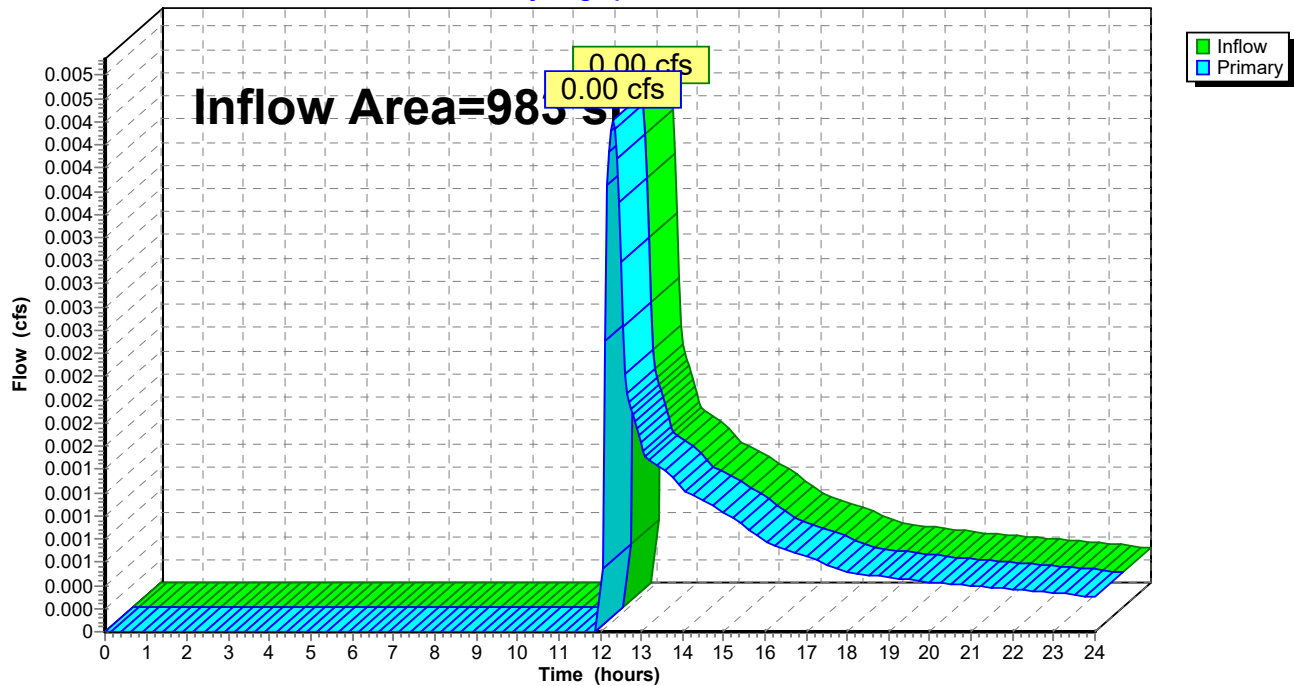
Summary for Link DP4: link

Inflow Area = 983 sf, 0.00% Impervious, Inflow Depth > 0.43" for 10-Year event
Inflow = 0.00 cfs @ 12.30 hrs, Volume= 35 cf
Primary = 0.00 cfs @ 12.30 hrs, Volume= 35 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

Hydrograph



PRE*Type III 24-hr 25-Year Rainfall=6.16"*

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

Subcatchment E1: E1

Runoff Area=7,632 sf 12.57% Impervious Runoff Depth>2.74"
Tc=6.0 min UI Adjusted CN=68 Runoff=0.55 cfs 1,744 cf

Subcatchment E2: E2

Runoff Area=14,039 sf 15.71% Impervious Runoff Depth>1.30"
Tc=6.0 min UI Adjusted CN=51 Runoff=0.40 cfs 1,516 cf

Subcatchment E3: E3

Runoff Area=4,679 sf 11.18% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=70 Runoff=0.36 cfs 1,142 cf

Subcatchment E4: E4

Runoff Area=983 sf 0.00% Impervious Runoff Depth>0.93"
Tc=6.0 min CN=46 Runoff=0.02 cfs 76 cf

Link DP1: link

Inflow=0.55 cfs 1,744 cf
Primary=0.55 cfs 1,744 cf

Link DP2: link

Inflow=0.40 cfs 1,516 cf
Primary=0.40 cfs 1,516 cf

Link DP3: link

Inflow=0.36 cfs 1,142 cf
Primary=0.36 cfs 1,142 cf

Link DP4: link

Inflow=0.02 cfs 76 cf
Primary=0.02 cfs 76 cf

Total Runoff Area = 27,333 sf Runoff Volume = 4,478 cf Average Runoff Depth = 1.97"
86.51% Pervious = 23,646 sf 13.49% Impervious = 3,687 sf

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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Subcatchment E1: E1

Runoff = 0.55 cfs @ 12.10 hrs, Volume= 1,744 cf, Depth> 2.74"
Routed to Link DP1 : link

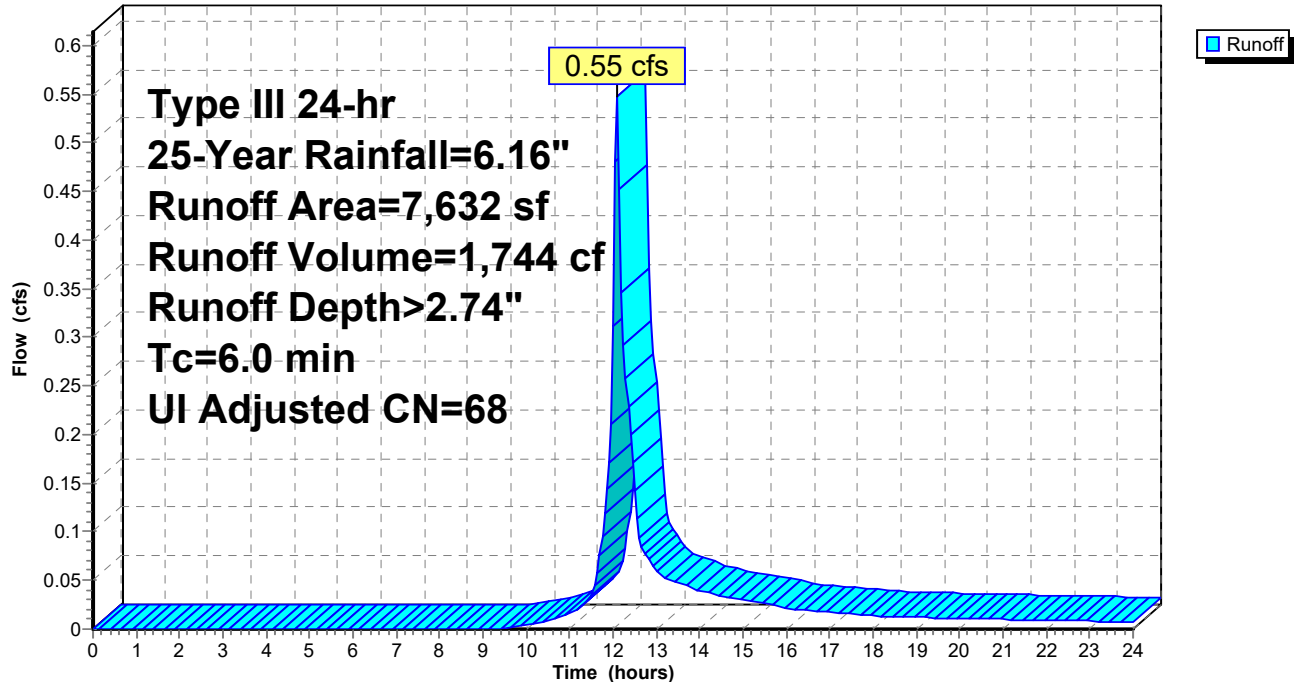
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Adj	Description
959	98		Unconnected roofs, HSG A
3,103	96		Gravel surface, HSG A
3,570	39		>75% Grass cover, Good, HSG A
7,632	70	68	Weighted Average, UI Adjusted
6,673			87.43% Pervious Area
959			12.57% Impervious Area
959			100.00% Unconnected

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

Subcatchment E1: E1

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Subcatchment E2: E2

Runoff = 0.40 cfs @ 12.11 hrs, Volume= 1,516 cf, Depth> 1.30"
Routed to Link DP2 : link

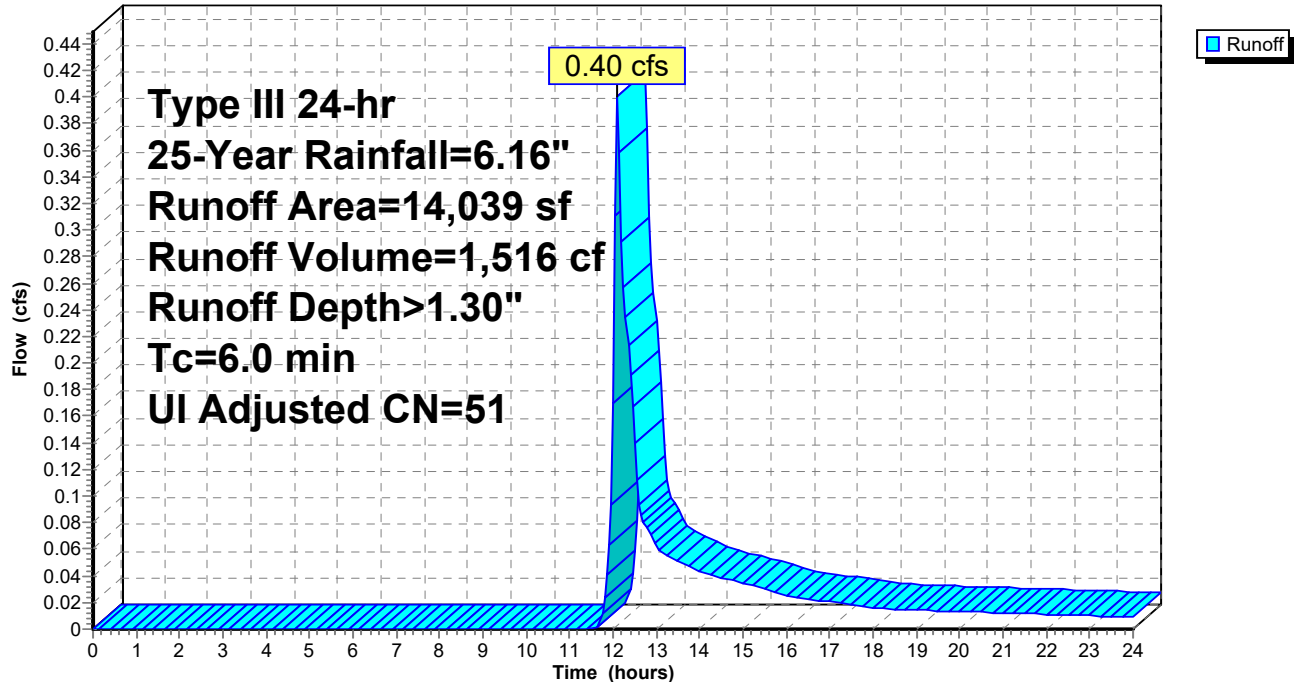
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Adj	Description
2,205	98		Unconnected roofs, HSG A
1,666	96		Gravel surface, HSG A
10,168	39		>75% Grass cover, Good, HSG A
14,039	55	51	Weighted Average, UI Adjusted
11,834			84.29% Pervious Area
2,205			15.71% Impervious Area
2,205			100.00% Unconnected

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

Subcatchment E2: E2

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Subcatchment E3: E3

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 1,142 cf, Depth> 2.93"
Routed to Link DP3 : link

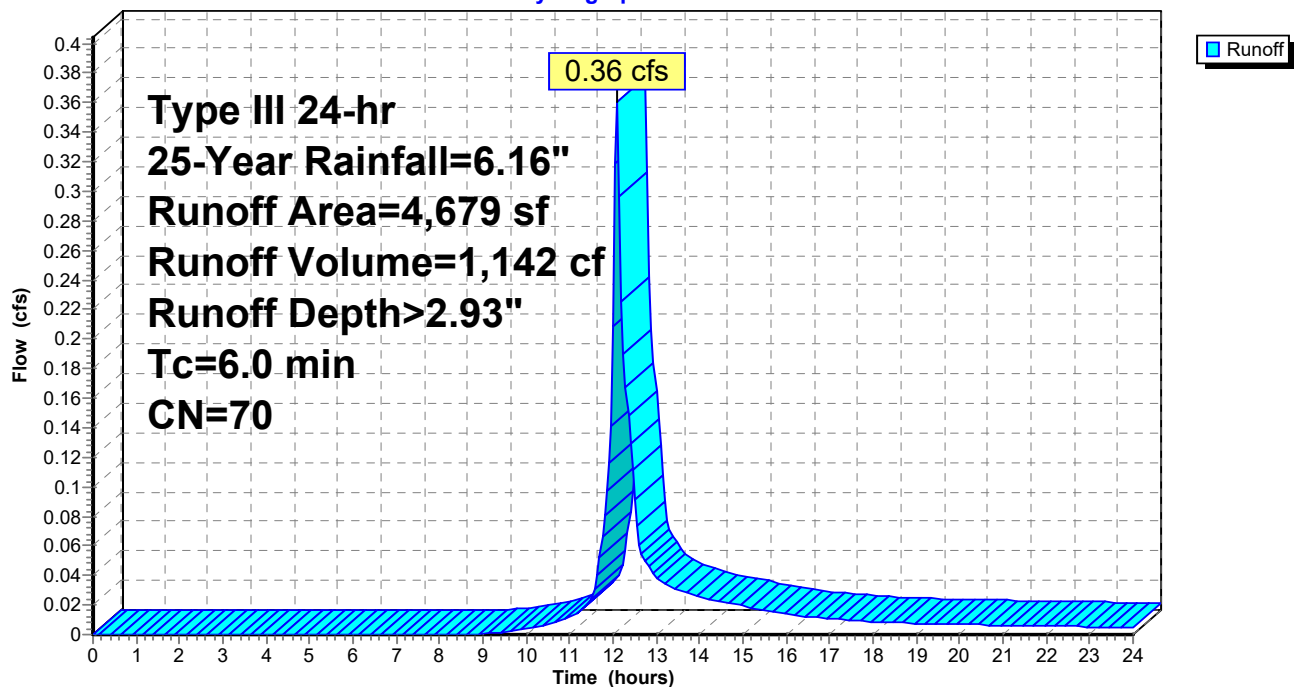
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
523	98	Roofs, HSG A
1,963	96	Gravel surface, HSG A
2,193	39	>75% Grass cover, Good, HSG A
4,679	70	Weighted Average
4,156		88.82% Pervious Area
523		11.18% Impervious Area

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

Subcatchment E3: E3

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Subcatchment E4: E4

Runoff = 0.02 cfs @ 12.12 hrs, Volume= 76 cf, Depth> 0.93"
Routed to Link DP4 : link

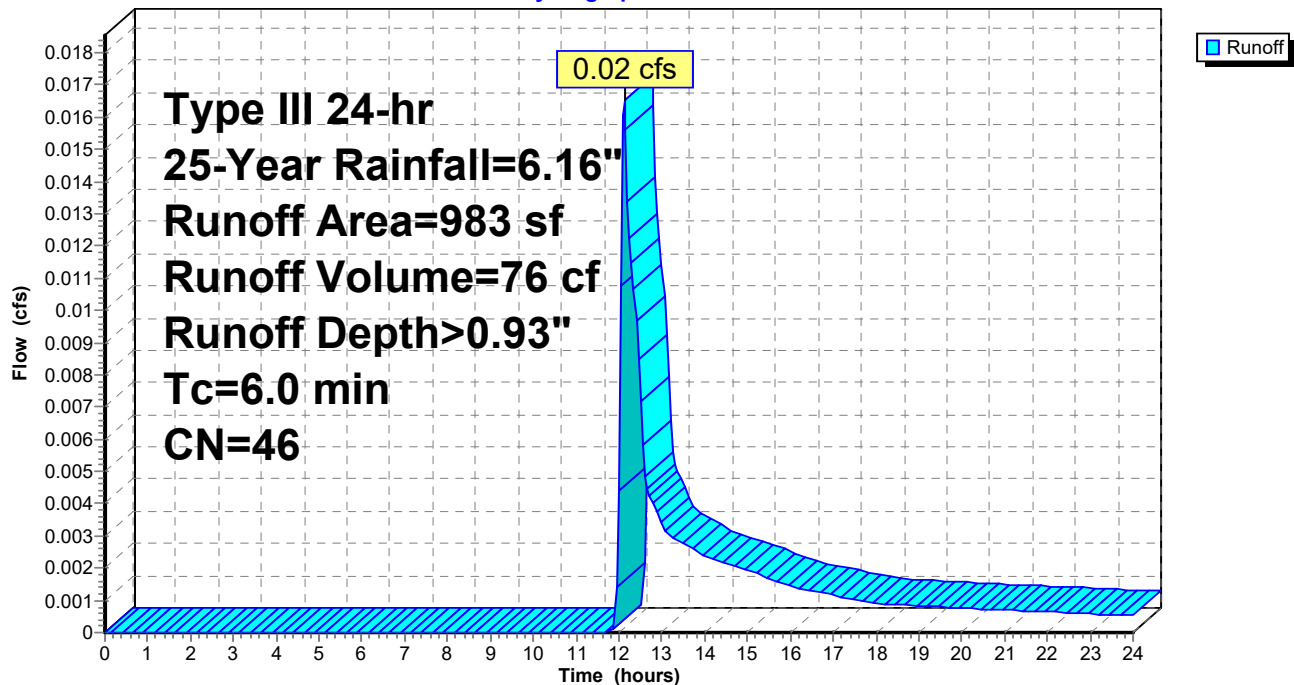
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
113	96	Gravel surface, HSG A
870	39	>75% Grass cover, Good, HSG A
983	46	Weighted Average
983		100.00% Pervious Area

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

Subcatchment E4: E4

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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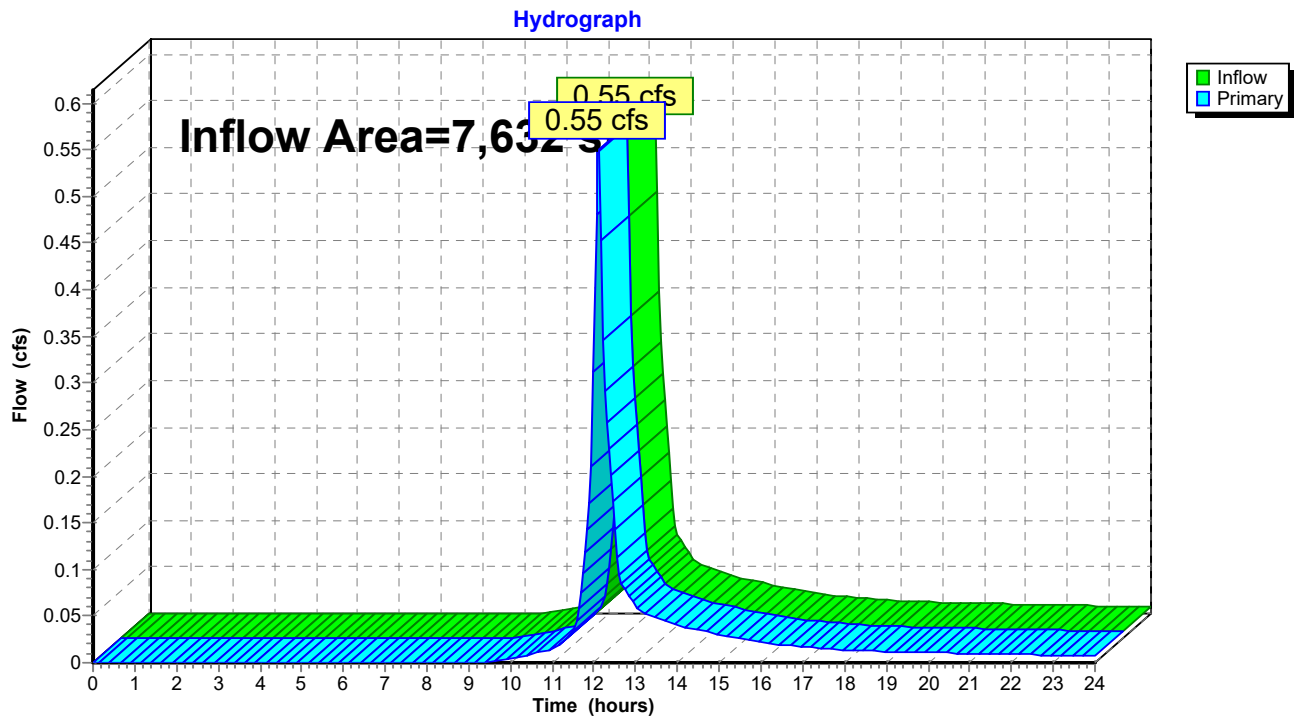
Page 30

Summary for Link DP1: link

Inflow Area = 7,632 sf, 12.57% Impervious, Inflow Depth > 2.74" for 25-Year event
Inflow = 0.55 cfs @ 12.10 hrs, Volume= 1,744 cf
Primary = 0.55 cfs @ 12.10 hrs, Volume= 1,744 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link



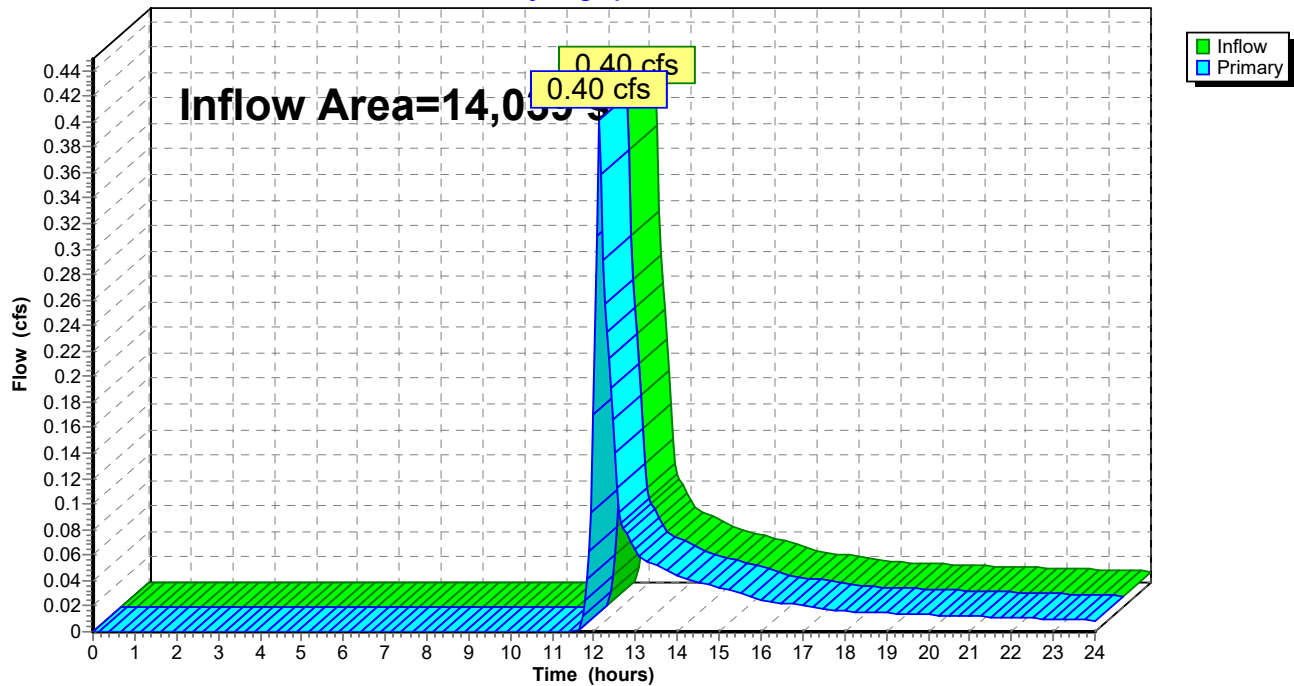
Summary for Link DP2: link

Inflow Area = 14,039 sf, 15.71% Impervious, Inflow Depth > 1.30" for 25-Year event
Inflow = 0.40 cfs @ 12.11 hrs, Volume= 1,516 cf
Primary = 0.40 cfs @ 12.11 hrs, Volume= 1,516 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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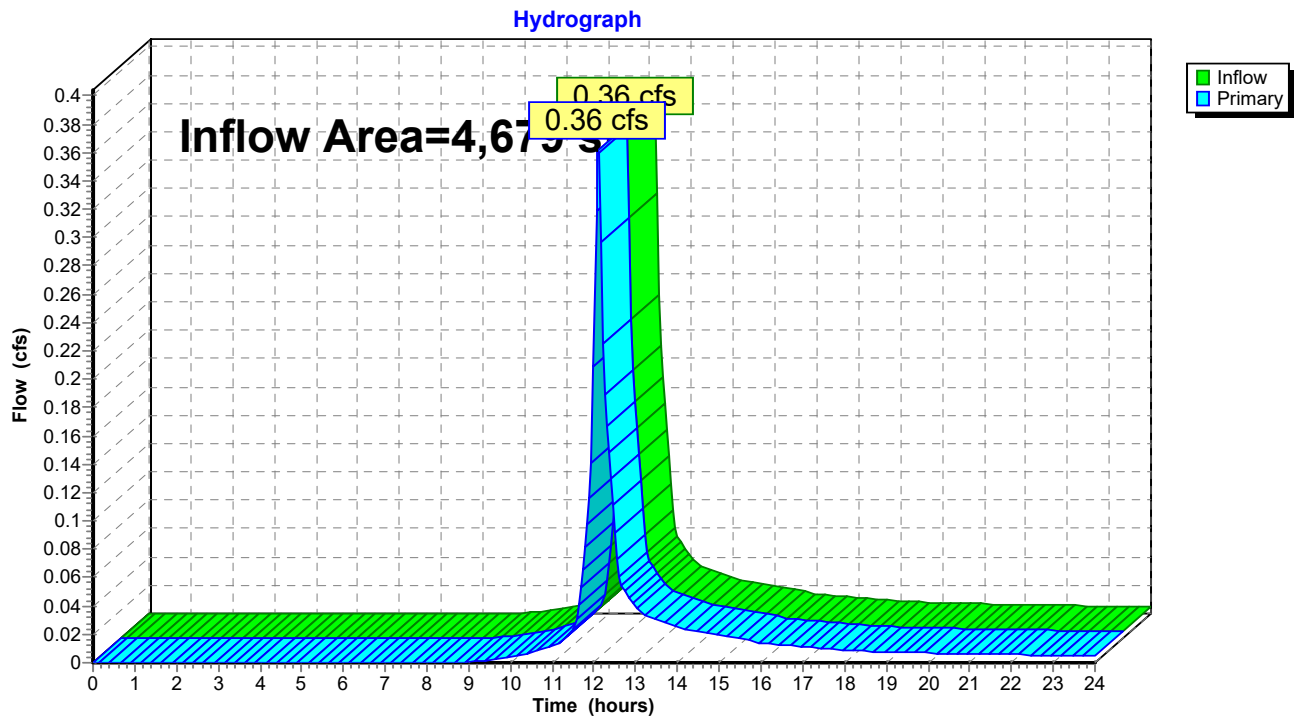
Page 32

Summary for Link DP3: link

Inflow Area = 4,679 sf, 11.18% Impervious, Inflow Depth > 2.93" for 25-Year event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 1,142 cf
Primary = 0.36 cfs @ 12.09 hrs, Volume= 1,142 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

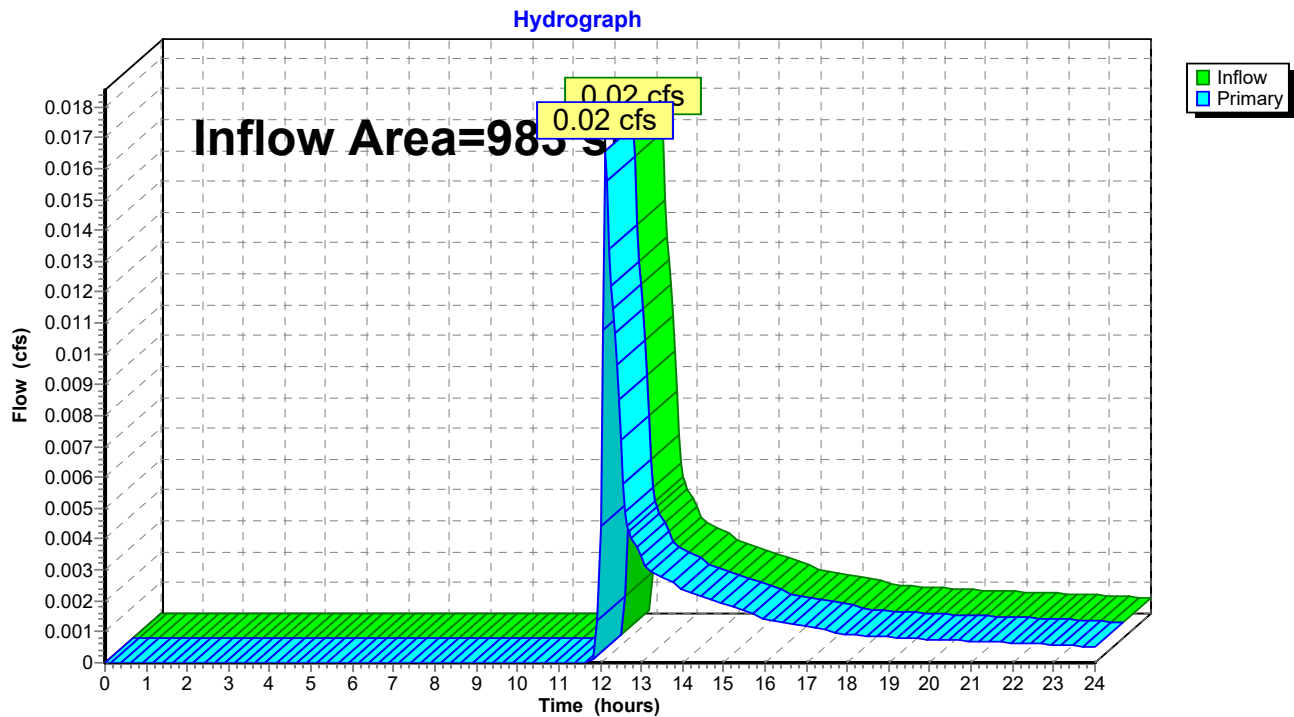
Link DP3: link



Summary for Link DP4: link

Inflow Area = 983 sf, 0.00% Impervious, Inflow Depth > 0.93" for 25-Year event
Inflow = 0.02 cfs @ 12.12 hrs, Volume= 76 cf
Primary = 0.02 cfs @ 12.12 hrs, Volume= 76 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

PRE*Type III 24-hr 100-Year Rainfall=8.94"*

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

Subcatchment E1: E1

Runoff Area=7,632 sf 12.57% Impervious Runoff Depth>5.03"
Tc=6.0 min UI Adjusted CN=68 Runoff=1.01 cfs 3,200 cf

Subcatchment E2: E2

Runoff Area=14,039 sf 15.71% Impervious Runoff Depth>2.96"
Tc=6.0 min UI Adjusted CN=51 Runoff=1.05 cfs 3,462 cf

Subcatchment E3: E3

Runoff Area=4,679 sf 11.18% Impervious Runoff Depth>5.28"
Tc=6.0 min CN=70 Runoff=0.65 cfs 2,058 cf

Subcatchment E4: E4

Runoff Area=983 sf 0.00% Impervious Runoff Depth>2.37"
Tc=6.0 min CN=46 Runoff=0.06 cfs 194 cf

Link DP1: link

Inflow=1.01 cfs 3,200 cf
Primary=1.01 cfs 3,200 cf

Link DP2: link

Inflow=1.05 cfs 3,462 cf
Primary=1.05 cfs 3,462 cf

Link DP3: link

Inflow=0.65 cfs 2,058 cf
Primary=0.65 cfs 2,058 cf

Link DP4: link

Inflow=0.06 cfs 194 cf
Primary=0.06 cfs 194 cf

Total Runoff Area = 27,333 sf Runoff Volume = 8,914 cf Average Runoff Depth = 3.91"
86.51% Pervious = 23,646 sf 13.49% Impervious = 3,687 sf

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Type III 24-hr 100-Year Rainfall=8.94"

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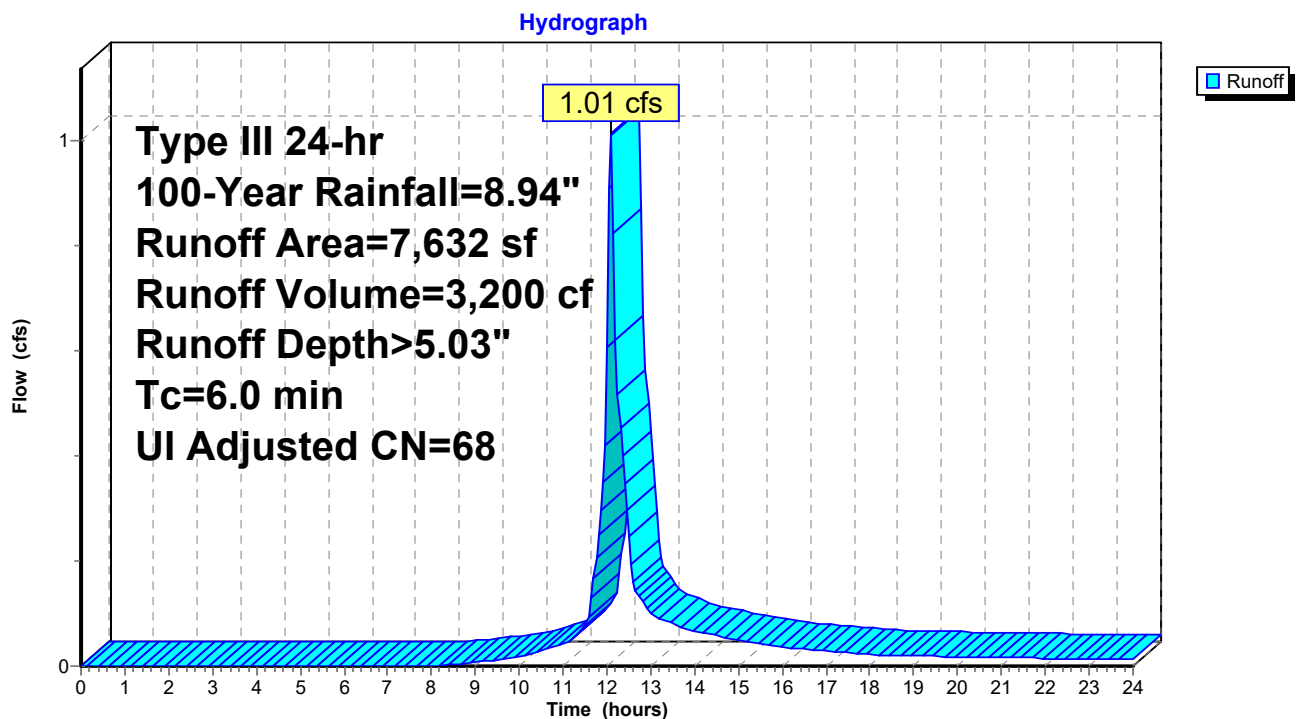
Summary for Subcatchment E1: E1

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 3,200 cf, Depth> 5.03"
Routed to Link DP1 : link

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Adj	Description
959	98		Unconnected roofs, HSG A
3,103	96		Gravel surface, HSG A
3,570	39		>75% Grass cover, Good, HSG A
7,632	70	68	Weighted Average, UI Adjusted
6,673			87.43% Pervious Area
959			12.57% Impervious Area
959			100.00% Unconnected

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

Subcatchment E1: E1

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Summary for Subcatchment E2: E2

Runoff = 1.05 cfs @ 12.10 hrs, Volume= 3,462 cf, Depth> 2.96"
Routed to Link DP2 : link

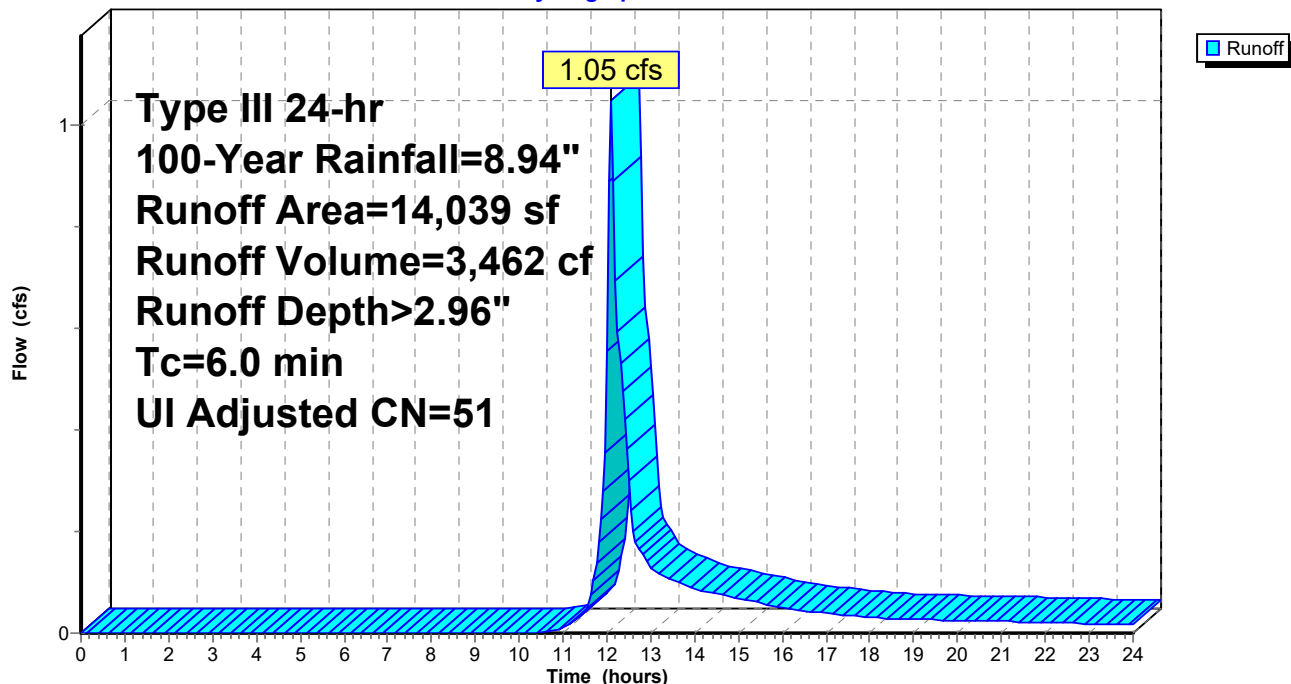
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Adj	Description
2,205	98		Unconnected roofs, HSG A
1,666	96		Gravel surface, HSG A
10,168	39		>75% Grass cover, Good, HSG A
14,039	55	51	Weighted Average, UI Adjusted
11,834			84.29% Pervious Area
2,205			15.71% Impervious Area
2,205			100.00% Unconnected

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

Subcatchment E2: E2

Hydrograph



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Type III 24-hr 100-Year Rainfall=8.94"

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Summary for Subcatchment E3: E3

Runoff = 0.65 cfs @ 12.09 hrs, Volume= 2,058 cf, Depth> 5.28"
Routed to Link DP3 : link

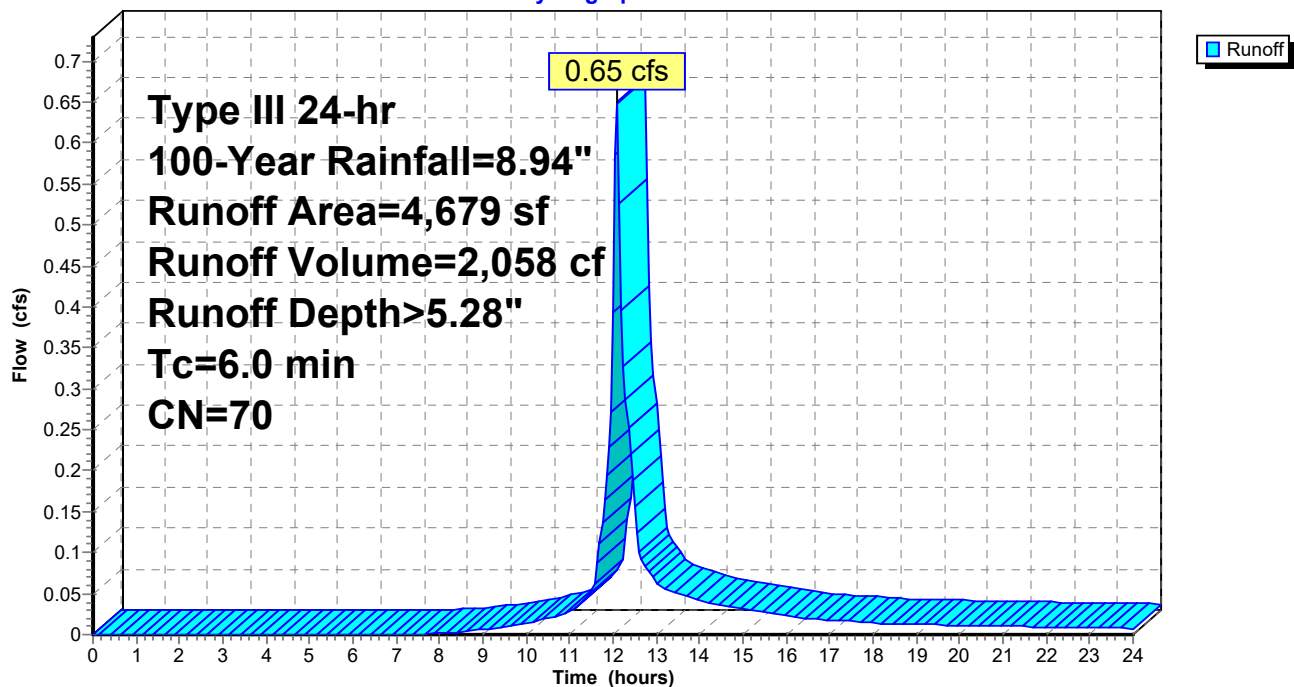
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
523	98	Roofs, HSG A
1,963	96	Gravel surface, HSG A
2,193	39	>75% Grass cover, Good, HSG A
4,679	70	Weighted Average
4,156		88.82% Pervious Area
523		11.18% Impervious Area

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

Subcatchment E3: E3

Hydrograph



Summary for Subcatchment E4: E4

Runoff = 0.06 cfs @ 12.10 hrs, Volume= 194 cf, Depth> 2.37"
 Routed to Link DP4 : link

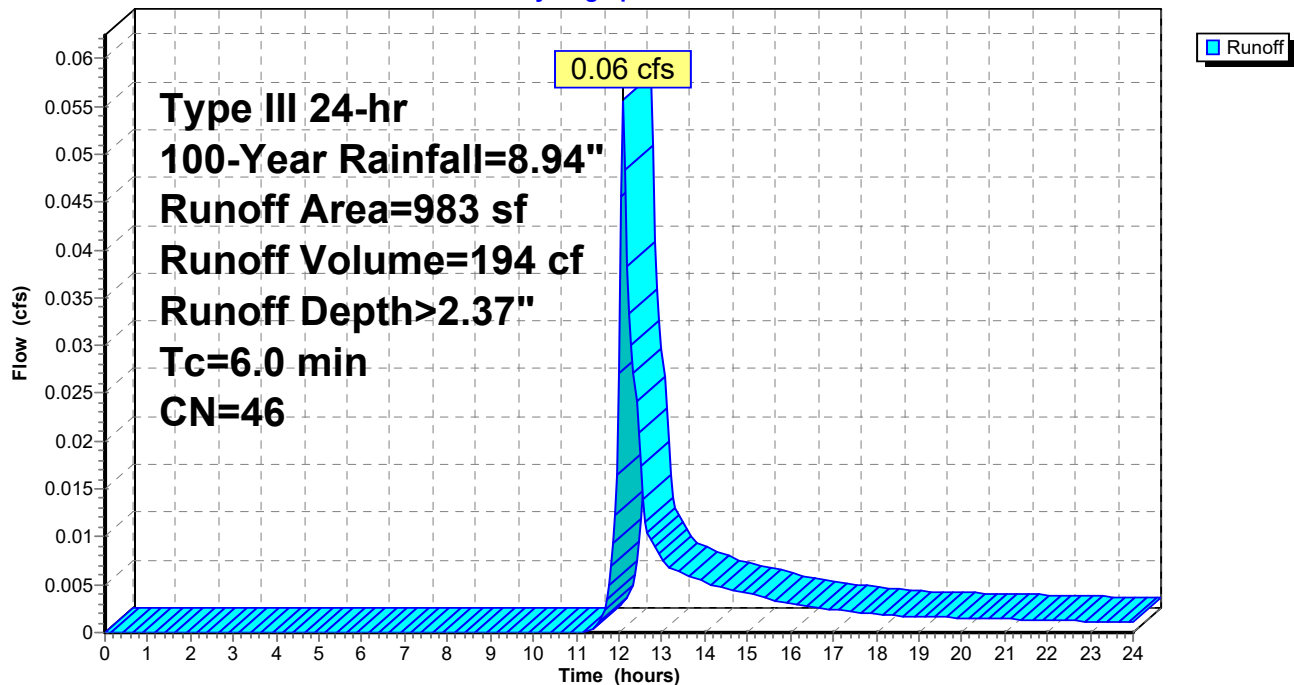
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
113	96	Gravel surface, HSG A
870	39	>75% Grass cover, Good, HSG A
983	46	Weighted Average
983		100.00% Pervious Area

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

Subcatchment E4: E4

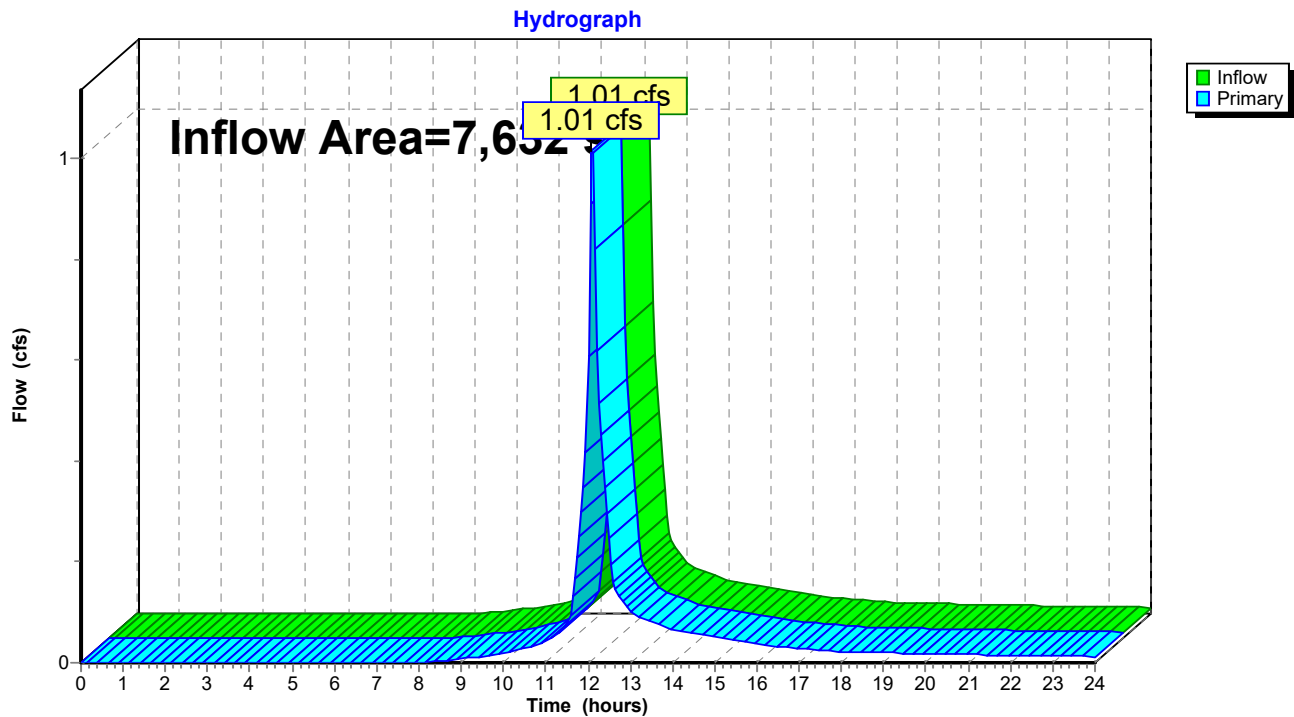
Hydrograph



Summary for Link DP1: link

Inflow Area = 7,632 sf, 12.57% Impervious, Inflow Depth > 5.03" for 100-Year event
Inflow = 1.01 cfs @ 12.09 hrs, Volume= 3,200 cf
Primary = 1.01 cfs @ 12.09 hrs, Volume= 3,200 cf, Atten= 0%, Lag= 0.0 min

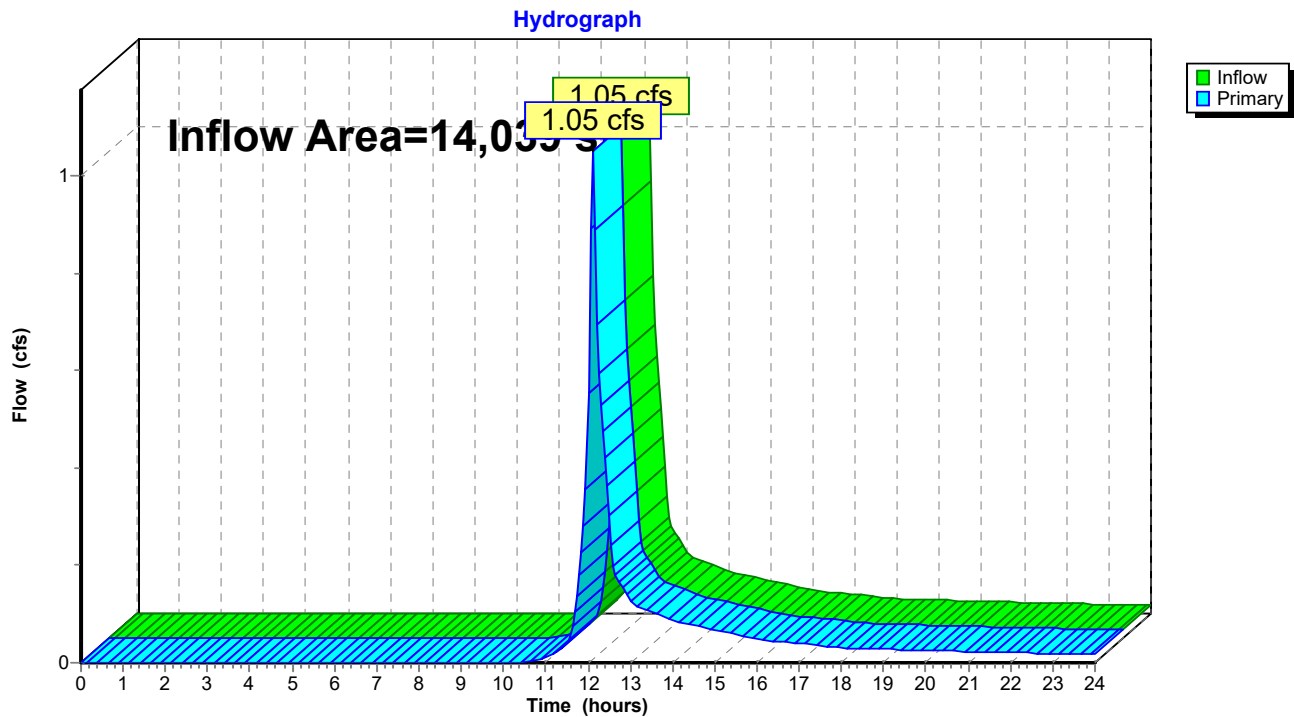
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link

Summary for Link DP2: link

Inflow Area = 14,039 sf, 15.71% Impervious, Inflow Depth > 2.96" for 100-Year event
Inflow = 1.05 cfs @ 12.10 hrs, Volume= 3,462 cf
Primary = 1.05 cfs @ 12.10 hrs, Volume= 3,462 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link

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Type III 24-hr 100-Year Rainfall=8.94"

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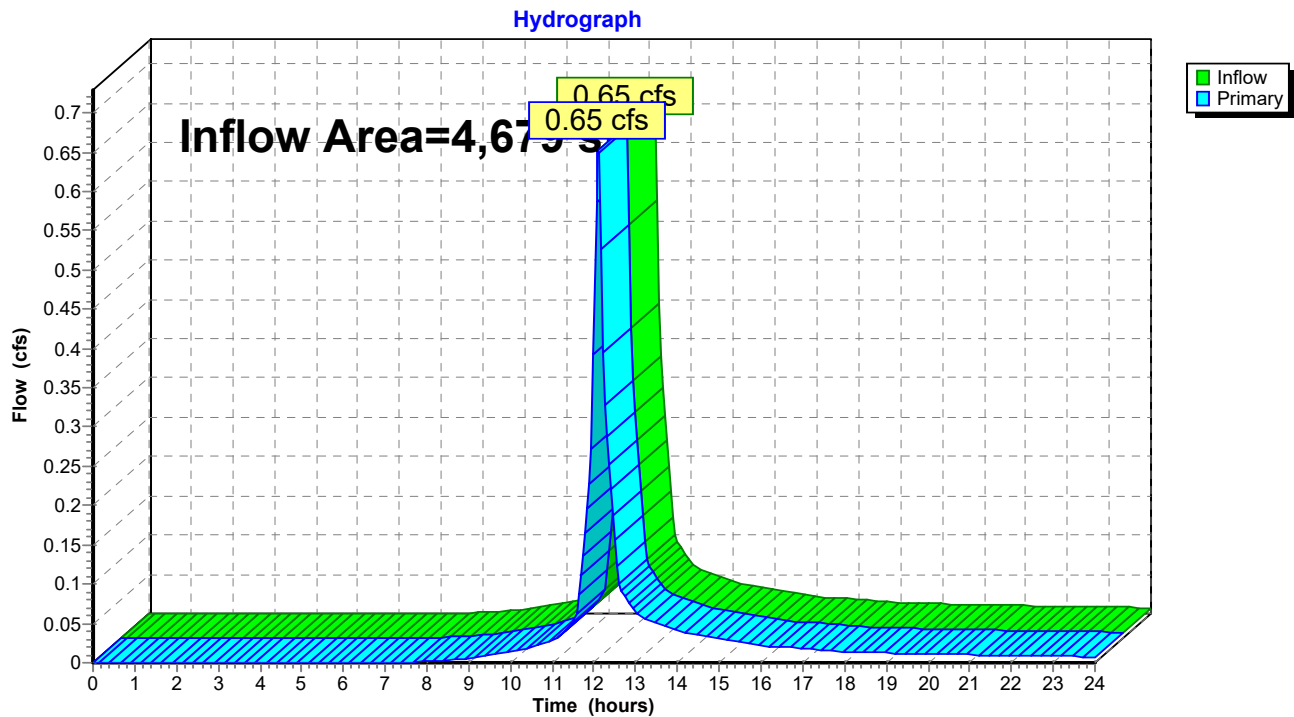
Page 41

Summary for Link DP3: link

Inflow Area = 4,679 sf, 11.18% Impervious, Inflow Depth > 5.28" for 100-Year event
Inflow = 0.65 cfs @ 12.09 hrs, Volume= 2,058 cf
Primary = 0.65 cfs @ 12.09 hrs, Volume= 2,058 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

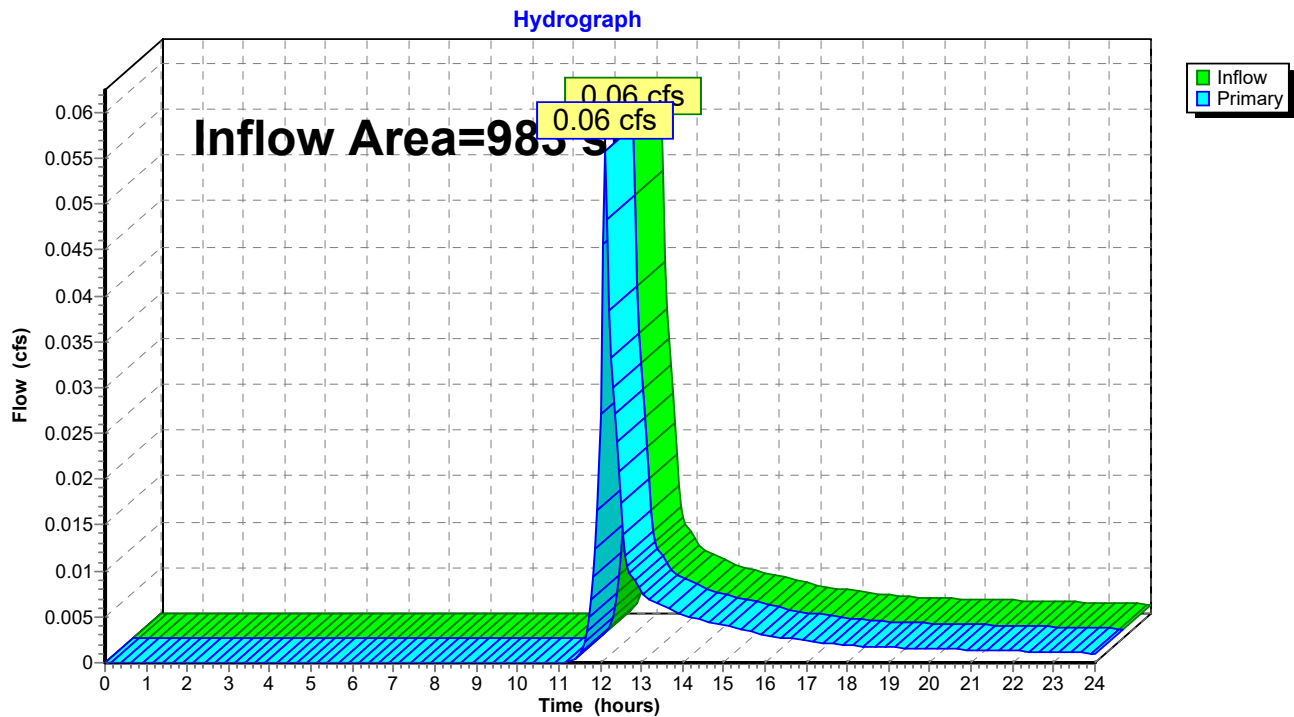
Link DP3: link



Summary for Link DP4: link

Inflow Area = 983 sf, 0.00% Impervious, Inflow Depth > 2.37" for 100-Year event
Inflow = 0.06 cfs @ 12.10 hrs, Volume= 194 cf
Primary = 0.06 cfs @ 12.10 hrs, Volume= 194 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

c. Proposed Conditions HydroCAD Report

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Page 2

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4258 MA Salisbury Essex County

Rainfall events imported from "EX. CON. 8-30-23.hcp"

Rainfall events imported from "Atlas-14-Rain.txt" for 440 MA Essex

Rainfall events imported from "Atlas-14-Rain.txt" for 440 MA Essex

Rainfall events imported from "Atlas-14-Rain.txt" for 440 MA Essex

Rainfall events imported from "Atlas-14-Rain.txt" for 440 MA Essex

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.15	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.83	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.16	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.94	2

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Page 4

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
13,110	39	>75% Grass cover, Good, HSG A (P1, P2, P3, P4, P6A, P6B)
8,273	98	Paved parking, HSG A (P5A, P5B, P6A, P6B)
5,769	98	Roofs, HSG A (P1, P2, P7)
27,152	70	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
27,152	HSG A	P1, P2, P3, P4, P5A, P5B, P6A, P6B, P7
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
27,152		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
13,110	0	0	0	0	13,110	>75% Grass cover, Good	
8,273	0	0	0	0	8,273	Paved parking	
5,769	0	0	0	0	5,769	Roofs	
27,152	0	0	0	0	27,152	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1P	119.15	119.11	7.5	0.0053	0.013	0.0	12.0	0.0	
2	3P	114.86	114.70	30.5	0.0052	0.013	0.0	12.0	0.0	
3	5P	114.78	114.70	14.5	0.0055	0.013	0.0	12.0	0.0	
4	6P	114.70	114.60	3.0	0.0333	0.013	0.0	12.0	0.0	
5	7P	119.15	119.11	7.5	0.0053	0.013	0.0	12.0	0.0	
6	8P	119.01	118.90	22.0	0.0050	0.013	0.0	12.0	0.0	
7	10P	118.80	118.70	12.0	0.0083	0.013	0.0	12.0	0.0	

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Type III 24-hr 2-Year Rainfall=3.15"

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

SubcatchmentP1: P1	Runoff Area=4,532 sf 12.29% Impervious Runoff Depth>0.05" Tc=6.0 min CN=46 Runoff=0.00 cfs 19 cf
SubcatchmentP2: P2	Runoff Area=8,858 sf 24.43% Impervious Runoff Depth>0.18" Tc=6.0 min CN=53 Runoff=0.01 cfs 136 cf
SubcatchmentP3: P3	Runoff Area=283 sf 0.00% Impervious Runoff Depth>0.00" Tc=6.0 min CN=39 Runoff=0.00 cfs 0 cf
SubcatchmentP4: P4A	Runoff Area=532 sf 0.00% Impervious Runoff Depth>0.00" Tc=6.0 min CN=39 Runoff=0.00 cfs 0 cf
SubcatchmentP5A: P5A	Runoff Area=1,227 sf 100.00% Impervious Runoff Depth>2.92" Tc=6.0 min CN=98 Runoff=0.08 cfs 298 cf
SubcatchmentP5B: P5B	Runoff Area=741 sf 100.00% Impervious Runoff Depth>2.92" Tc=6.0 min CN=98 Runoff=0.05 cfs 180 cf
SubcatchmentP6A: P6A	Runoff Area=2,010 sf 85.82% Impervious Runoff Depth>2.12" Tc=6.0 min CN=90 Runoff=0.11 cfs 355 cf
SubcatchmentP6B: P6B	Runoff Area=5,921 sf 77.35% Impervious Runoff Depth>1.71" Tc=6.0 min CN=85 Runoff=0.27 cfs 845 cf
SubcatchmentP7: P7	Runoff Area=3,048 sf 100.00% Impervious Runoff Depth>2.92" Tc=6.0 min CN=98 Runoff=0.21 cfs 741 cf
Pond 1P: CB1	Peak Elev=119.29' Inflow=0.05 cfs 180 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 '/' Outflow=0.05 cfs 180 cf
Pond 2P: SUBSURFACE INFILTRATION #2	Peak Elev=114.45' Storage=268 cf Inflow=0.38 cfs 1,201 cf Outflow=0.10 cfs 1,200 cf
Pond 3P: CB3	Peak Elev=115.06' Inflow=0.11 cfs 355 cf 12.0" Round Culvert n=0.013 L=30.5' S=0.0052 '/' Outflow=0.11 cfs 355 cf
Pond 4P: SUBSURFACE INFILTRATION #1	Peak Elev=119.09' Storage=138 cf Inflow=0.13 cfs 478 cf Outflow=0.02 cfs 478 cf
Pond 5P: CB4	Peak Elev=115.10' Inflow=0.27 cfs 845 cf 12.0" Round Culvert n=0.013 L=14.5' S=0.0055 '/' Outflow=0.27 cfs 845 cf
Pond 6P: CDS2	Peak Elev=115.04' Inflow=0.38 cfs 1,201 cf 12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=0.38 cfs 1,201 cf
Pond 7P: CB2	Peak Elev=119.33' Inflow=0.08 cfs 298 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 '/' Outflow=0.08 cfs 298 cf

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Pond 8P: DMH1

Peak Elev=119.23' Inflow=0.13 cfs 478 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0050 '/ Outflow=0.13 cfs 478 cf

Pond 9P: SUBSURFACE INFILTRATION #3

Peak Elev=115.25' Storage=201 cf Inflow=0.21 cfs 741 cf
Outflow=0.04 cfs 740 cf

Pond 10P: CDS1

Peak Elev=119.01' Inflow=0.13 cfs 478 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 '/ Outflow=0.13 cfs 478 cf

Link DP1: link

Inflow=0.00 cfs 19 cf
Primary=0.00 cfs 19 cf

Link DP2: link

Inflow=0.01 cfs 136 cf
Primary=0.01 cfs 136 cf

Link DP3: link

Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link DP4: link

Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 27,152 sf Runoff Volume = 2,575 cf Average Runoff Depth = 1.14"
48.28% Pervious = 13,110 sf 51.72% Impervious = 14,042 sf

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Summary for Subcatchment P1: P1

Runoff = 0.00 cfs @ 15.17 hrs, Volume= 19 cf, Depth> 0.05"
Routed to Link DP1 : link

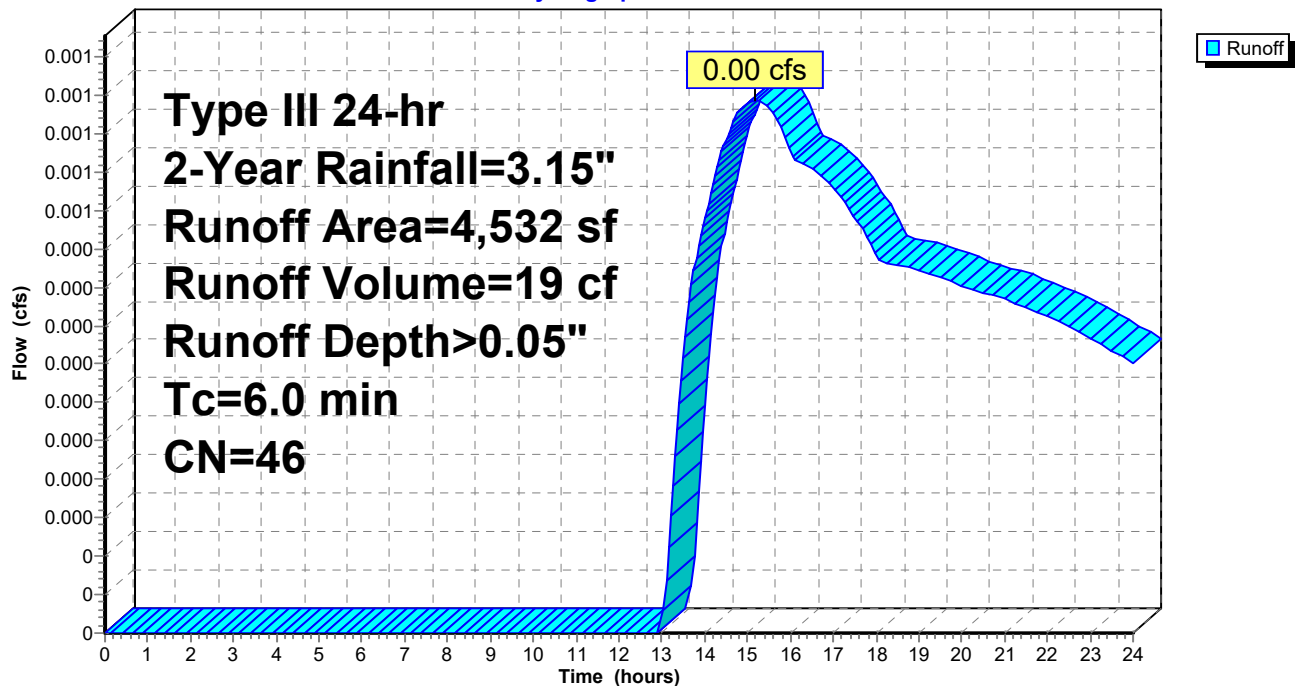
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
557	98	Roofs, HSG A
3,975	39	>75% Grass cover, Good, HSG A
4,532	46	Weighted Average
3,975		87.71% Pervious Area
557		12.29% Impervious Area

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

Subcatchment P1: P1

Hydrograph



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Summary for Subcatchment P2: P2

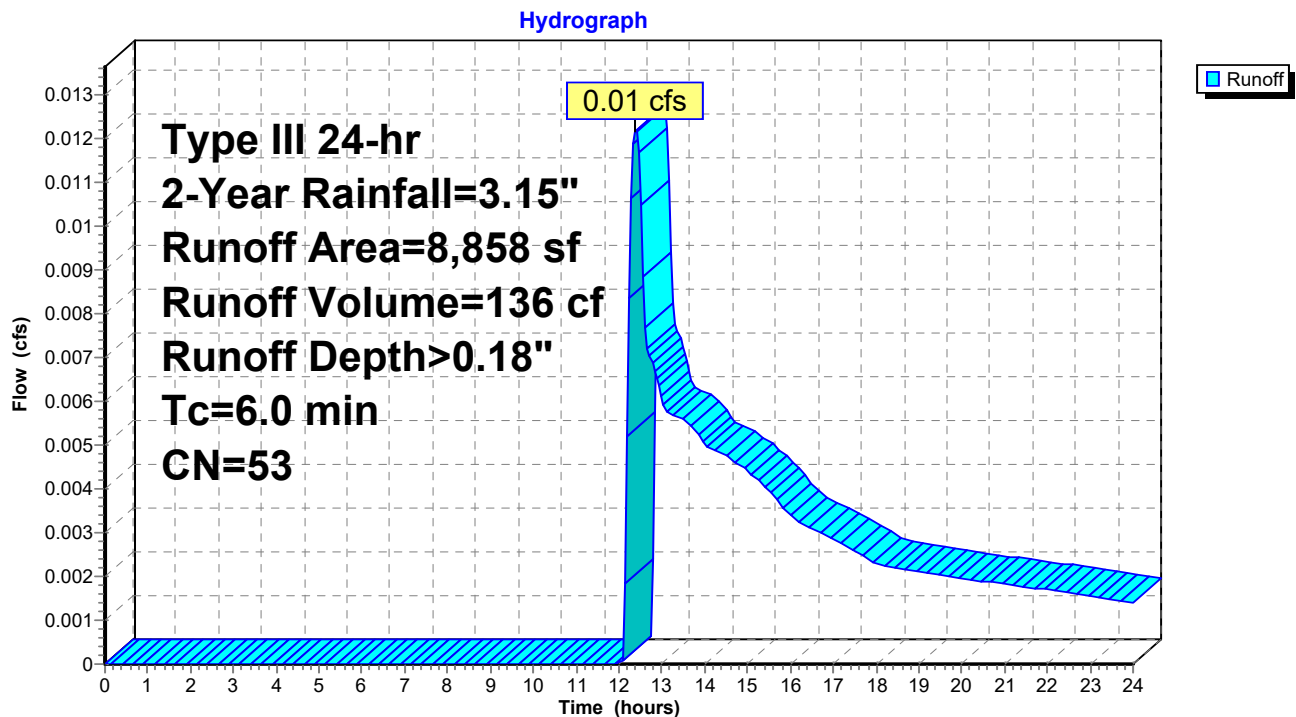
Runoff = 0.01 cfs @ 12.39 hrs, Volume= 136 cf, Depth> 0.18"
Routed to Link DP2 : link

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
2,164	98	Roofs, HSG A
6,694	39	>75% Grass cover, Good, HSG A
8,858	53	Weighted Average
6,694		75.57% Pervious Area
2,164		24.43% Impervious Area

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

Subcatchment P2: P2



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Summary for Subcatchment P3: P3

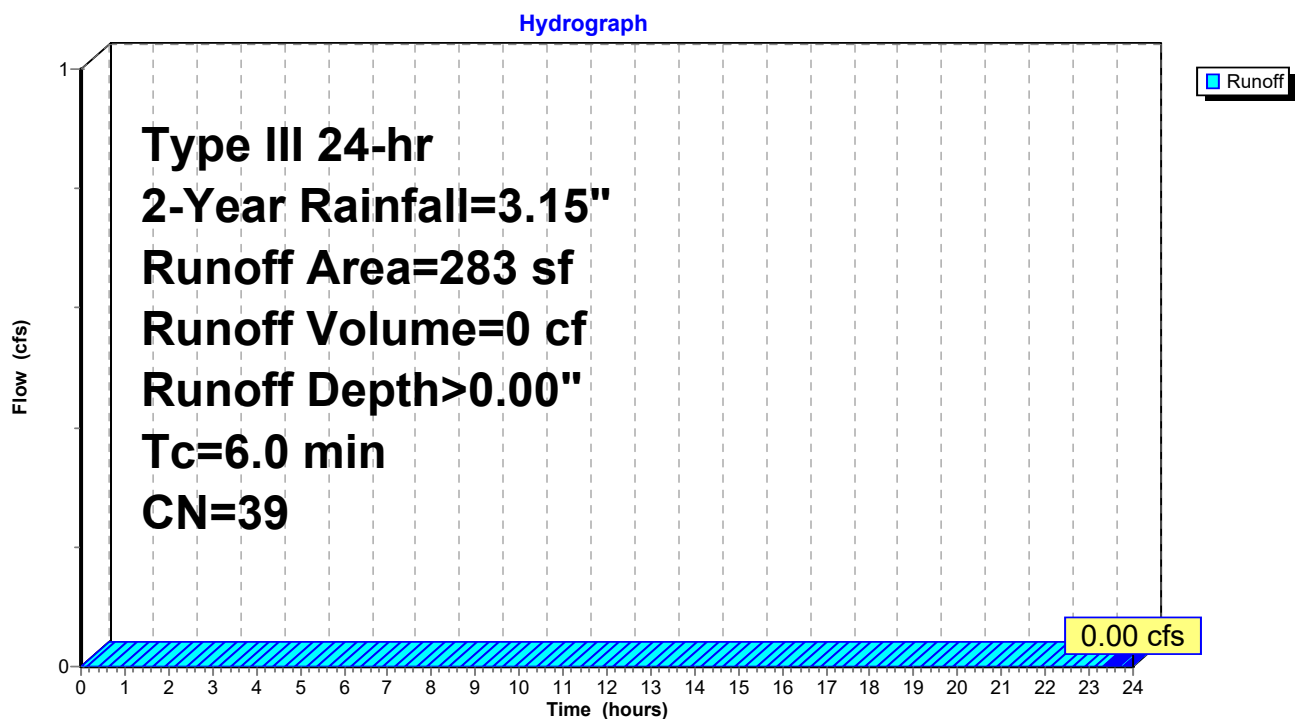
[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"
Routed to Link DP3 : link

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
283	39	>75% Grass cover, Good, HSG A
283		100.00% Pervious Area

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

Subcatchment P3: P3

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Summary for Subcatchment P4: P4A

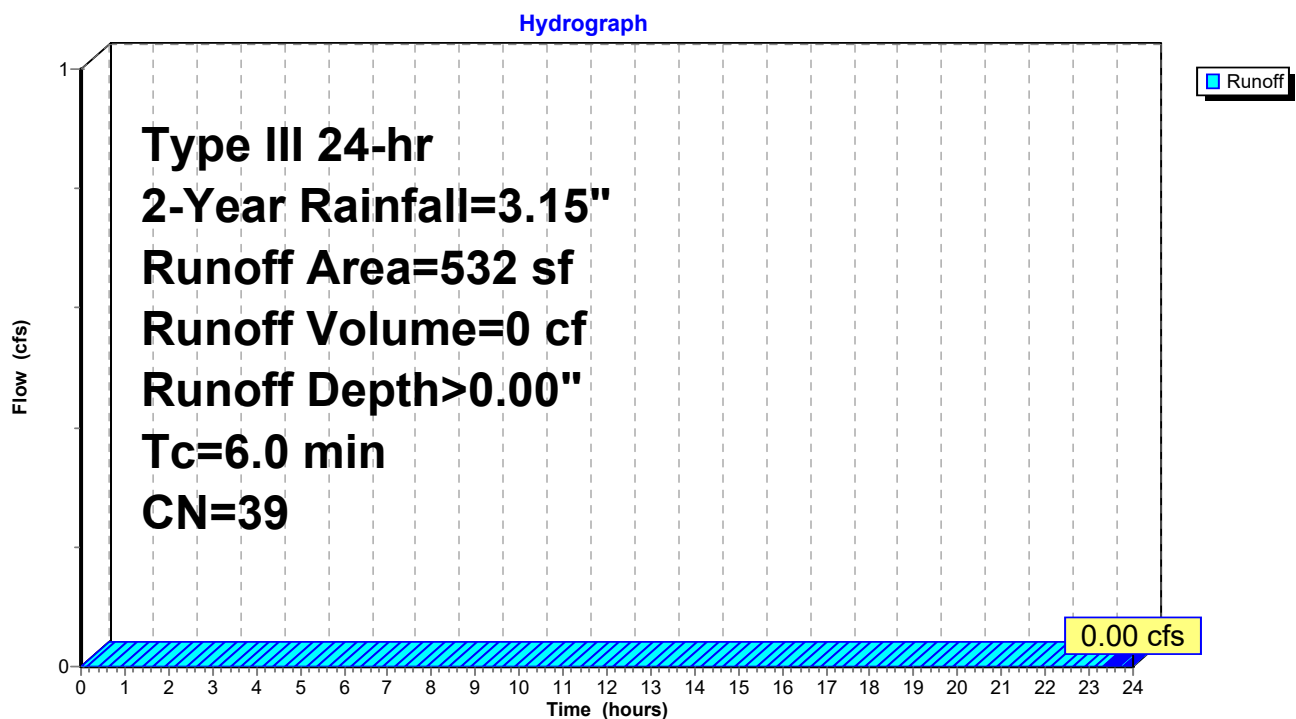
[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"
Routed to Link DP4 : link

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
532	39	>75% Grass cover, Good, HSG A
532		100.00% Pervious Area

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

Subcatchment P4: P4A

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Summary for Subcatchment P5A: P5A

Runoff = 0.08 cfs @ 12.09 hrs, Volume= 298 cf, Depth> 2.92"
Routed to Pond 7P : CB2

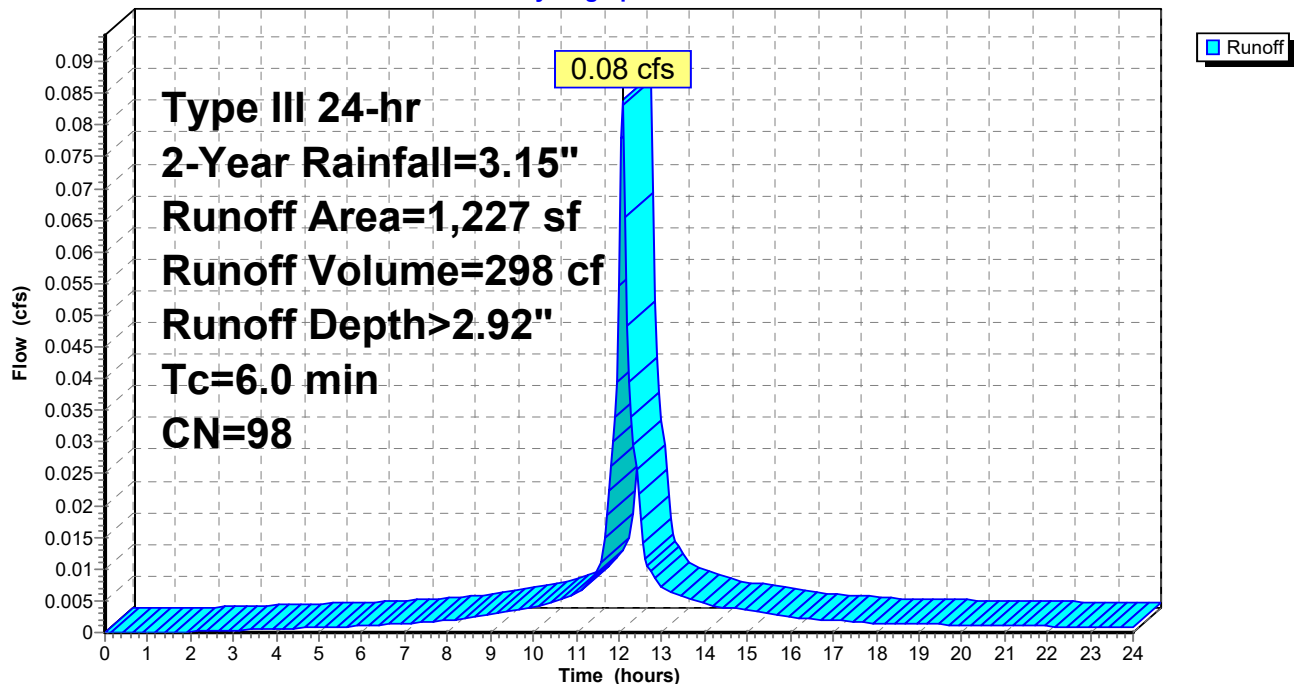
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,227	98	Paved parking, HSG A
1,227		100.00% Impervious Area

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

Subcatchment P5A: P5A

Hydrograph



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Summary for Subcatchment P5B: P5B

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 180 cf, Depth> 2.92"
Routed to Pond 1P : CB1

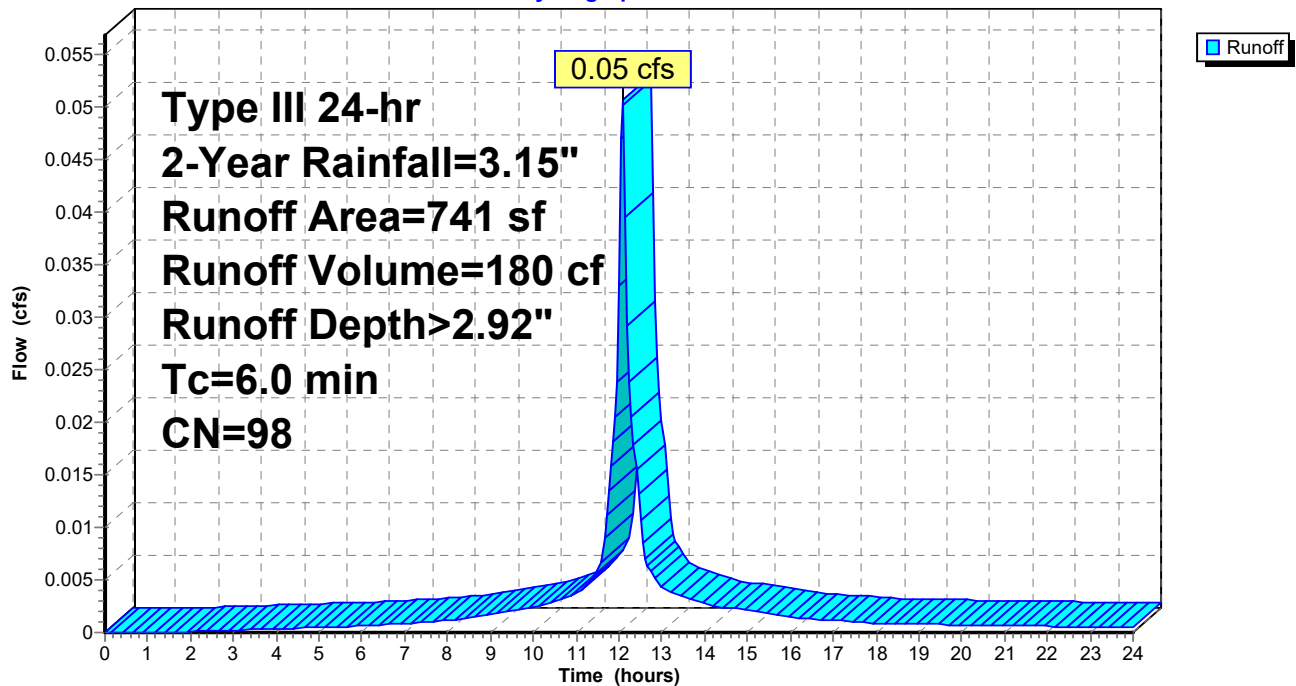
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
741	98	Paved parking, HSG A
741		100.00% Impervious Area

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

Subcatchment P5B: P5B

Hydrograph



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Summary for Subcatchment P6A: P6A

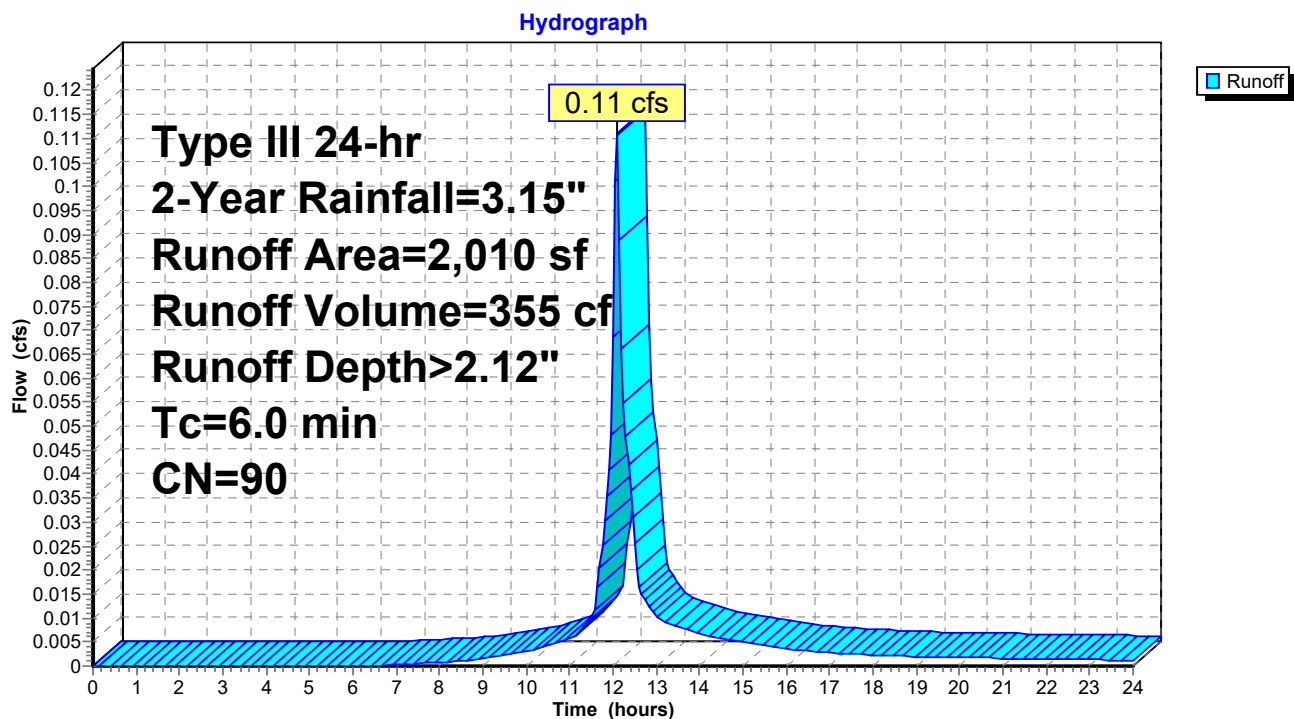
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 355 cf, Depth> 2.12"
Routed to Pond 3P : CB3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
285	39	>75% Grass cover, Good, HSG A
1,725	98	Paved parking, HSG A
2,010	90	Weighted Average
285		14.18% Pervious Area
1,725		85.82% Impervious Area

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

Subcatchment P6A: P6A



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Summary for Subcatchment P6B: P6B

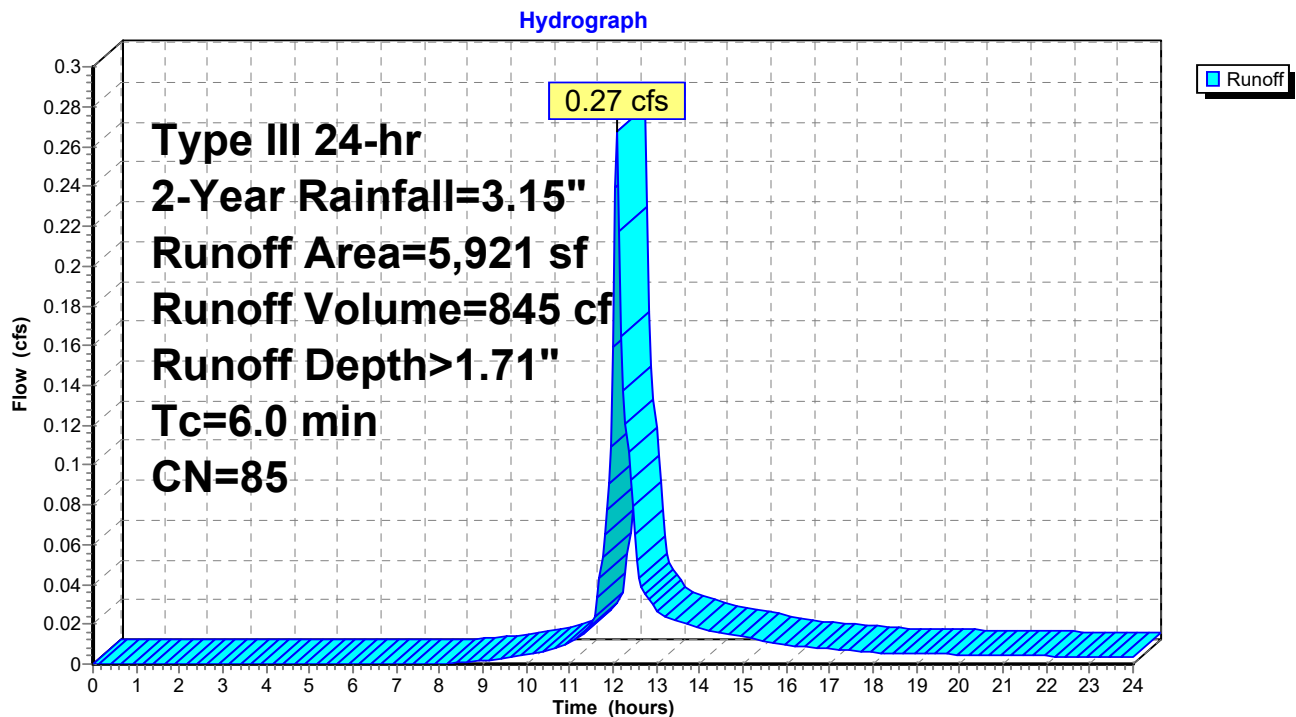
Runoff = 0.27 cfs @ 12.09 hrs, Volume= 845 cf, Depth> 1.71"
Routed to Pond 5P : CB4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,341	39	>75% Grass cover, Good, HSG A
4,580	98	Paved parking, HSG A
5,921	85	Weighted Average
1,341		22.65% Pervious Area
4,580		77.35% Impervious Area

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

Subcatchment P6B: P6B



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Summary for Subcatchment P7: P7

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 741 cf, Depth> 2.92"
Routed to Pond 9P : SUBSURFACE INFILTRATION #3

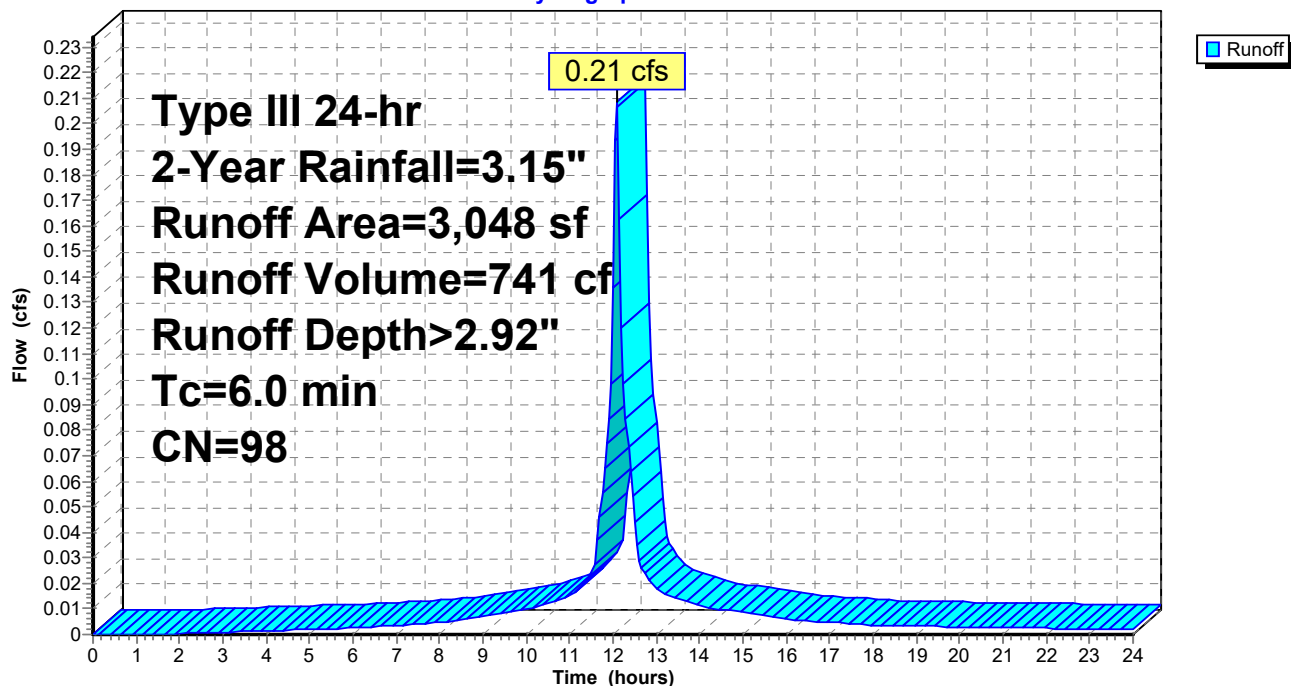
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
3,048	98	Roofs, HSG A
3,048		100.00% Impervious Area

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

Subcatchment P7: P7

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Summary for Pond 1P: CB1

Inflow Area = 741 sf, 100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 180 cf
Outflow = 0.05 cfs @ 12.09 hrs, Volume= 180 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.09 hrs, Volume= 180 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.29' @ 12.09 hrs

Flood Elev= 122.15'

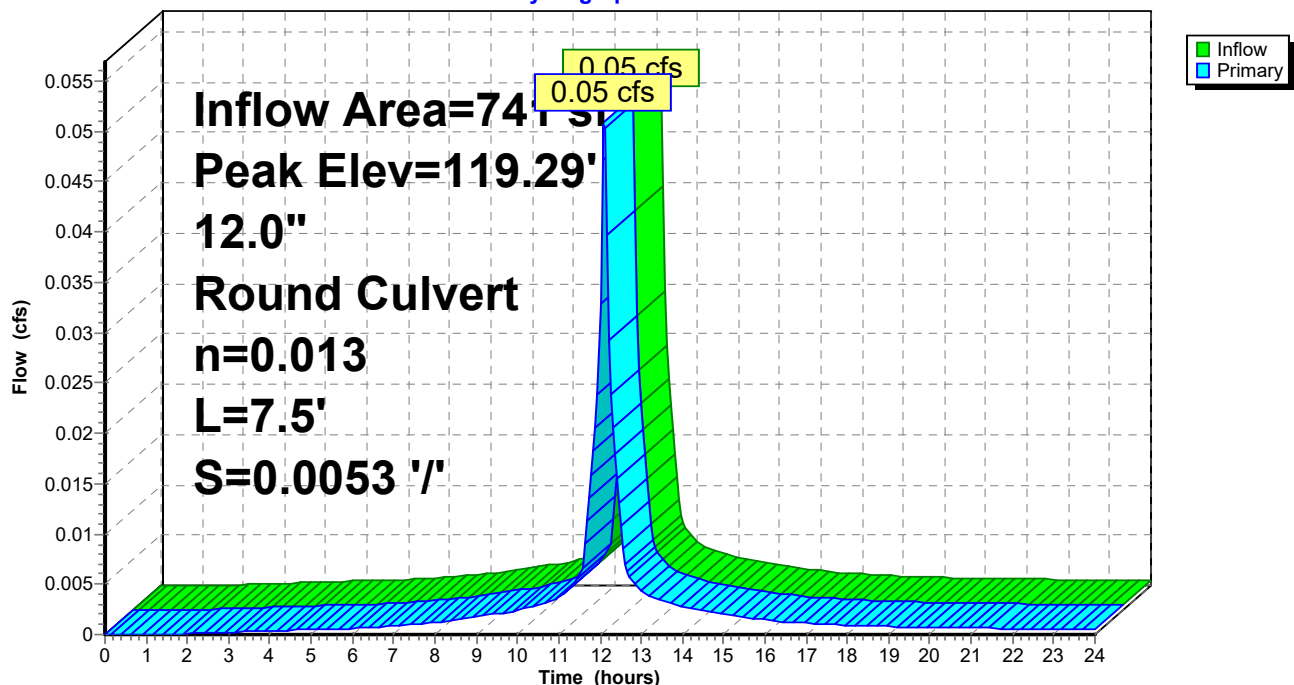
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.05 cfs @ 12.09 hrs HW=119.28' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 0.05 cfs @ 1.19 fps)

Pond 1P: CB1

Hydrograph



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Stage-Area-Storage for Pond 1P: CB1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

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Summary for Pond 2P: SUBSURFACE INFILTRATION #2

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 1.82" for 2-Year event
 Inflow = 0.38 cfs @ 12.09 hrs, Volume= 1,201 cf
 Outflow = 0.10 cfs @ 12.47 hrs, Volume= 1,200 cf, Atten= 73%, Lag= 22.7 min
 Primary = 0.10 cfs @ 12.47 hrs, Volume= 1,200 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 114.45' @ 12.47 hrs Surf.Area= 1,494 sf Storage= 268 cf

Plug-Flow detention time= 16.2 min calculated for 1,197 cf (100% of inflow)
 Center-of-Mass det. time= 15.8 min (836.4 - 820.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.00'	1,064 cf	28.17'W x 53.04'L x 2.33'H Field A 3,486 cf Overall - 826 cf Embedded = 2,660 cf x 40.0% Voids
#2A	114.50'	826 cf	ADS_StormTech SC-310 +Cap x 56 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
		1,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	114.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.00'

Primary OutFlow Max=0.10 cfs @ 12.47 hrs HW=114.45' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.10 cfs)

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Pond 2P: SUBSURFACE INFILTRATION #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

8 Rows x 34.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 28.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

56 Chambers x 14.7 cf = 825.5 cf Chamber Storage

3,485.9 cf Field - 825.5 cf Chambers = 2,660.4 cf Stone x 40.0% Voids = 1,064.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,889.7 cf = 0.043 af

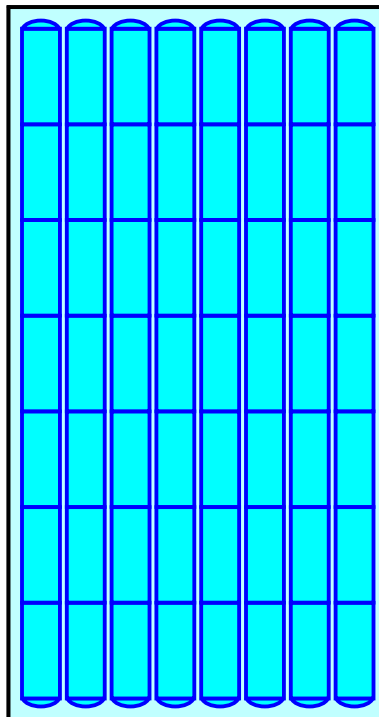
Overall Storage Efficiency = 54.2%

Overall System Size = 53.04' x 28.17' x 2.33'

56 Chambers

129.1 cy Field

98.5 cy Stone



POST

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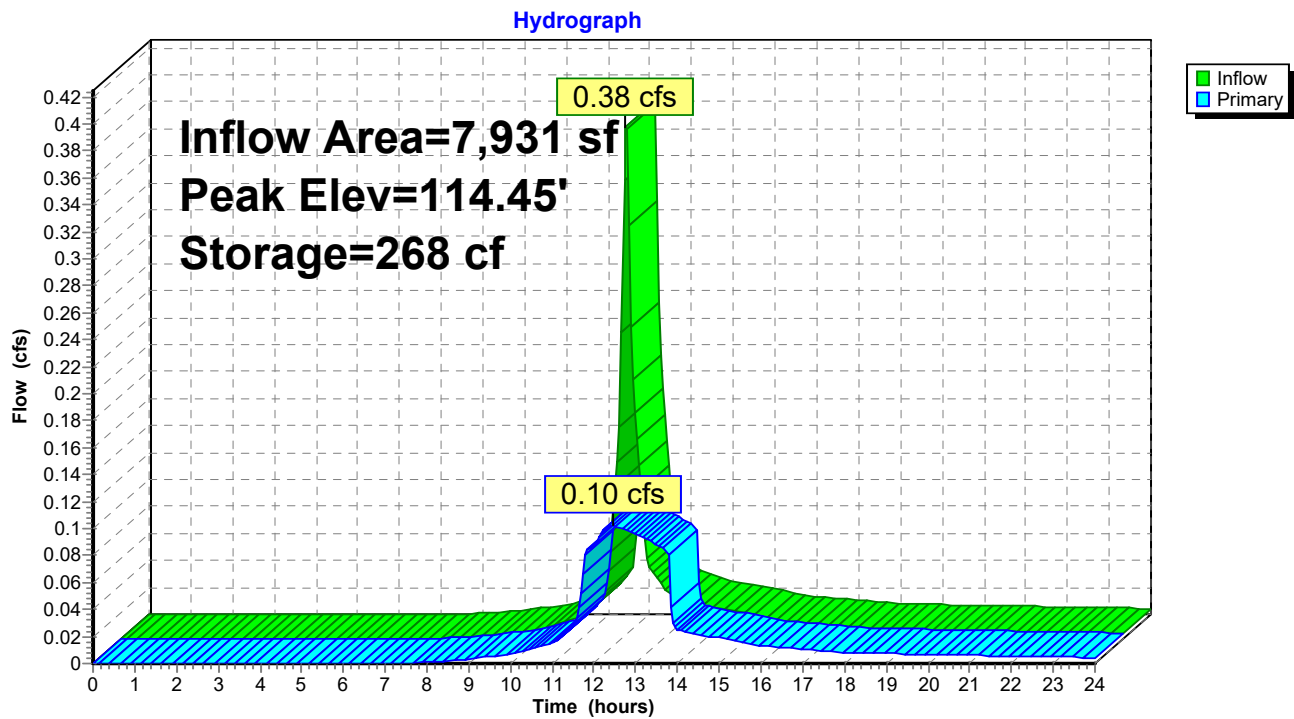
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Pond 2P: SUBSURFACE INFILTRATION #2



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Stage-Area-Storage for Pond 2P: SUBSURFACE INFILTRATION #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.00	1,494	0
114.05	1,494	30
114.10	1,494	60
114.15	1,494	90
114.20	1,494	120
114.25	1,494	149
114.30	1,494	179
114.35	1,494	209
114.40	1,494	239
114.45	1,494	269
114.50	1,494	299
114.55	1,494	357
114.60	1,494	416
114.65	1,494	474
114.70	1,494	532
114.75	1,494	589
114.80	1,494	646
114.85	1,494	702
114.90	1,494	757
114.95	1,494	812
115.00	1,494	866
115.05	1,494	920
115.10	1,494	973
115.15	1,494	1,024
115.20	1,494	1,075
115.25	1,494	1,125
115.30	1,494	1,174
115.35	1,494	1,222
115.40	1,494	1,268
115.45	1,494	1,313
115.50	1,494	1,357
115.55	1,494	1,398
115.60	1,494	1,436
115.65	1,494	1,473
115.70	1,494	1,507
115.75	1,494	1,539
115.80	1,494	1,571
115.85	1,494	1,601
115.90	1,494	1,631
115.95	1,494	1,661
116.00	1,494	1,690
116.05	1,494	1,720
116.10	1,494	1,750
116.15	1,494	1,780
116.20	1,494	1,810
116.25	1,494	1,840
116.30	1,494	1,870

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Summary for Pond 3P: CB3

Inflow Area = 2,010 sf, 85.82% Impervious, Inflow Depth > 2.12" for 2-Year event
Inflow = 0.11 cfs @ 12.09 hrs, Volume= 355 cf
Outflow = 0.11 cfs @ 12.09 hrs, Volume= 355 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.09 hrs, Volume= 355 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.06' @ 12.09 hrs

Flood Elev= 118.00'

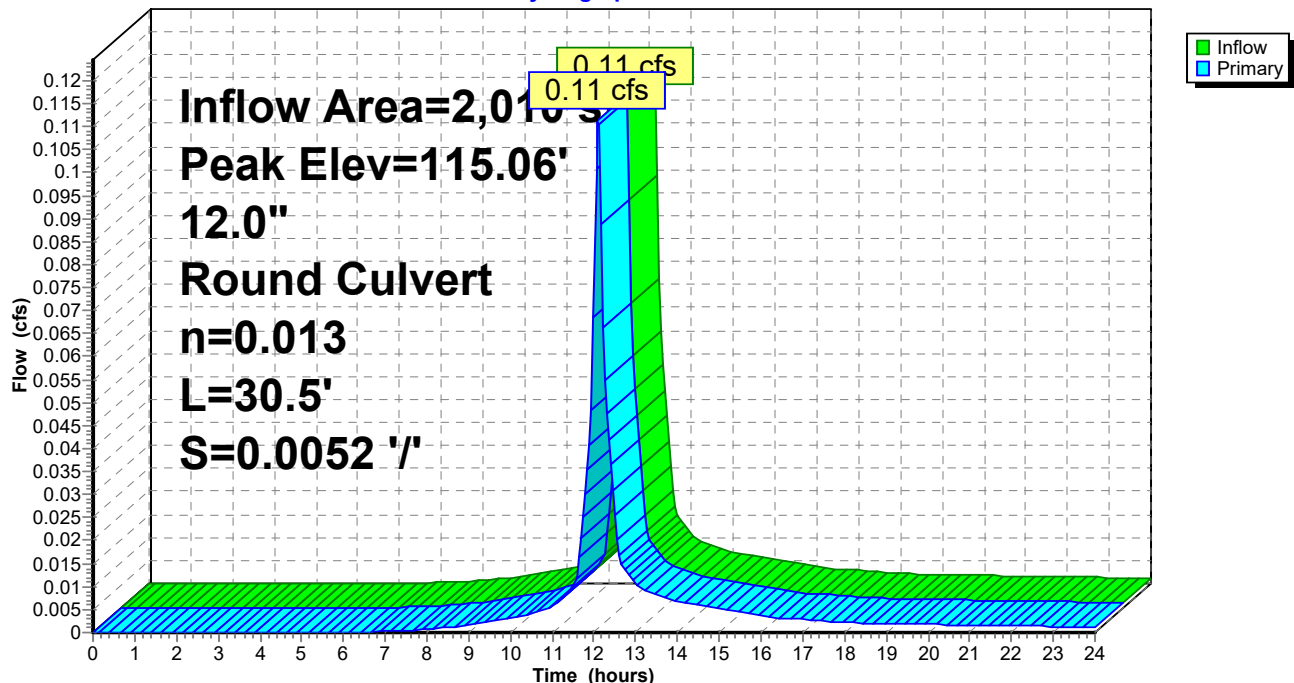
Device	Routing	Invert	Outlet Devices
#1	Primary	114.86'	12.0" Round Culvert L= 30.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.86' / 114.70' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.11 cfs @ 12.09 hrs HW=115.05' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.11 cfs @ 1.54 fps)

Pond 3P: CB3

Hydrograph



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Stage-Area-Storage for Pond 3P: CB3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0	117.42	0
115.32	0	116.38	0	117.44	0
115.34	0	116.40	0	117.46	0
115.36	0	116.42	0	117.48	0
115.38	0	116.44	0	117.50	0
115.40	0	116.46	0	117.52	0
115.42	0	116.48	0	117.54	0
115.44	0	116.50	0	117.56	0
115.46	0	116.52	0	117.58	0
115.48	0	116.54	0	117.60	0
115.50	0	116.56	0	117.62	0
115.52	0	116.58	0	117.64	0
115.54	0	116.60	0	117.66	0
115.56	0	116.62	0	117.68	0
115.58	0	116.64	0	117.70	0
115.60	0	116.66	0	117.72	0
115.62	0	116.68	0	117.74	0
115.64	0	116.70	0	117.76	0
115.66	0	116.72	0	117.78	0
115.68	0	116.74	0	117.80	0
115.70	0	116.76	0	117.82	0
115.72	0	116.78	0	117.84	0
115.74	0	116.80	0	117.86	0
115.76	0	116.82	0	117.88	0
115.78	0	116.84	0	117.90	0
115.80	0	116.86	0	117.92	0
115.82	0	116.88	0	117.94	0
115.84	0	116.90	0	117.96	0
115.86	0	116.92	0	117.98	0
115.88	0	116.94	0	118.00	0
115.90	0	116.96	0		

POST

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Summary for Pond 4P: SUBSURFACE INFILTRATION #1

[81] Warning: Exceeded Pond 10P by 0.21' @ 12.65 hrs

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
 Inflow = 0.13 cfs @ 12.09 hrs, Volume= 478 cf
 Outflow = 0.02 cfs @ 12.56 hrs, Volume= 478 cf, Atten= 83%, Lag= 28.1 min
 Primary = 0.02 cfs @ 12.56 hrs, Volume= 478 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 119.09' @ 12.56 hrs Surf.Area= 281 sf Storage= 138 cf

Plug-Flow detention time= 40.0 min calculated for 477 cf (100% of inflow)
 Center-of-Mass det. time= 39.5 min (795.8 - 756.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	118.20'	277 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 292 cf Embedded = 693 cf x 40.0% Voids
#2A	118.70'	292 cf	ADS_StormTech SC-740 b +Cap x 6 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		569 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 116.16'

Primary OutFlow Max=0.02 cfs @ 12.56 hrs HW=119.09' (Free Discharge)↑**1=Exfiltration** (Controls 0.02 cfs)

POST

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Pond 4P: SUBSURFACE INFILTRATION #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +12.0" End Stone x 2 = 17.86' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

6 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 291.6 cf Chamber Storage

984.3 cf Field - 291.6 cf Chambers = 692.8 cf Stone x 40.0% Voids = 277.1 cf Stone Storage

Chamber Storage + Stone Storage = 568.7 cf = 0.013 af

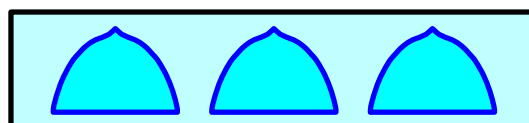
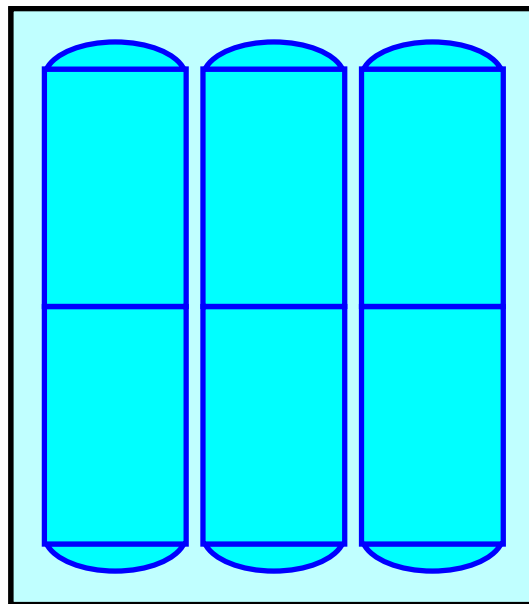
Overall Storage Efficiency = 57.8%

Overall System Size = 17.86' x 15.75' x 3.50'

6 Chambers

36.5 cy Field

25.7 cy Stone



POST

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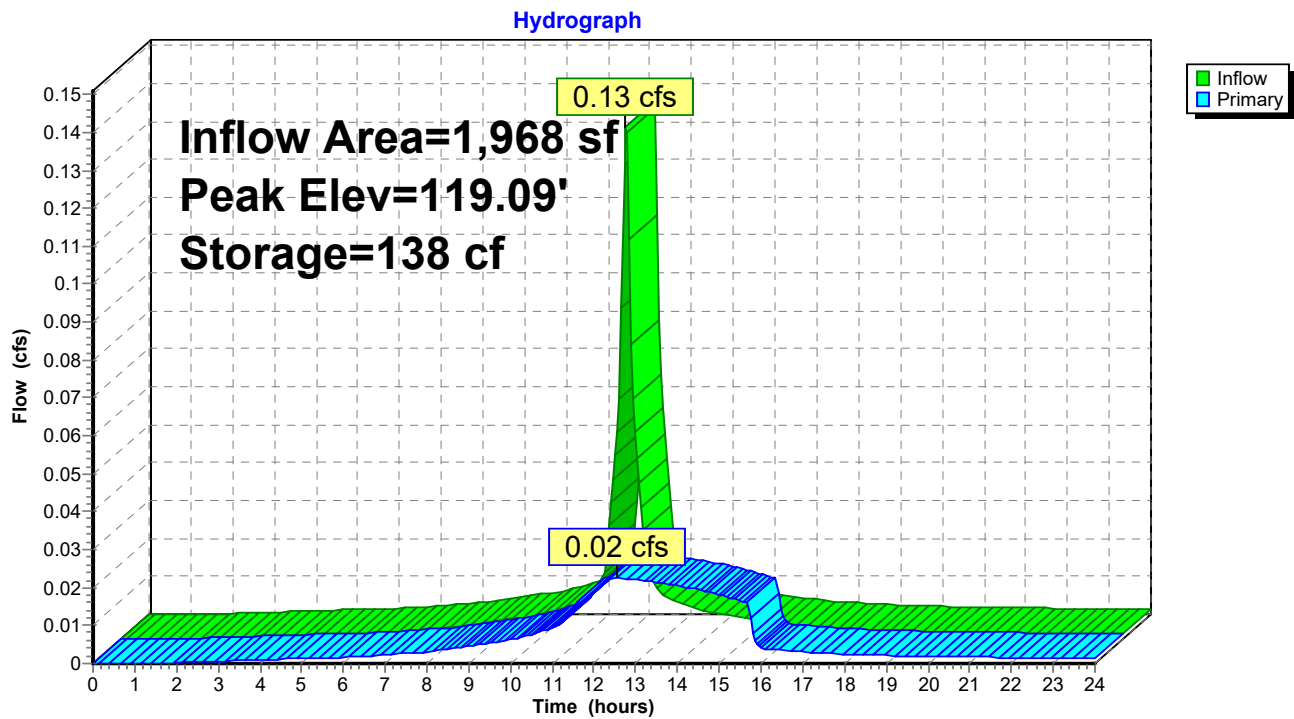
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Pond 4P: SUBSURFACE INFILTRATION #1



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Stage-Area-Storage for Pond 4P: SUBSURFACE INFILTRATION #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
118.20	281	0	120.85	281	468
118.25	281	6	120.90	281	475
118.30	281	11	120.95	281	482
118.35	281	17	121.00	281	489
118.40	281	22	121.05	281	495
118.45	281	28	121.10	281	501
118.50	281	34	121.15	281	507
118.55	281	39	121.20	281	512
118.60	281	45	121.25	281	518
118.65	281	51	121.30	281	524
118.70	281	56	121.35	281	529
118.75	281	67	121.40	281	535
118.80	281	78	121.45	281	541
118.85	281	88	121.50	281	546
118.90	281	99	121.55	281	552
118.95	281	109	121.60	281	557
119.00	281	120	121.65	281	563
119.05	281	131	121.70	281	569
119.10	281	141			
119.15	281	151			
119.20	281	162			
119.25	281	172			
119.30	281	183			
119.35	281	193			
119.40	281	203			
119.45	281	213			
119.50	281	223			
119.55	281	234			
119.60	281	244			
119.65	281	254			
119.70	281	264			
119.75	281	273			
119.80	281	283			
119.85	281	293			
119.90	281	303			
119.95	281	312			
120.00	281	322			
120.05	281	331			
120.10	281	341			
120.15	281	350			
120.20	281	359			
120.25	281	368			
120.30	281	377			
120.35	281	386			
120.40	281	395			
120.45	281	404			
120.50	281	412			
120.55	281	421			
120.60	281	429			
120.65	281	437			
120.70	281	445			
120.75	281	453			
120.80	281	461			

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Summary for Pond 5P: CB4

Inflow Area = 5,921 sf, 77.35% Impervious, Inflow Depth > 1.71" for 2-Year event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 845 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 845 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.09 hrs, Volume= 845 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.10' @ 12.09 hrs

Flood Elev= 117.40'

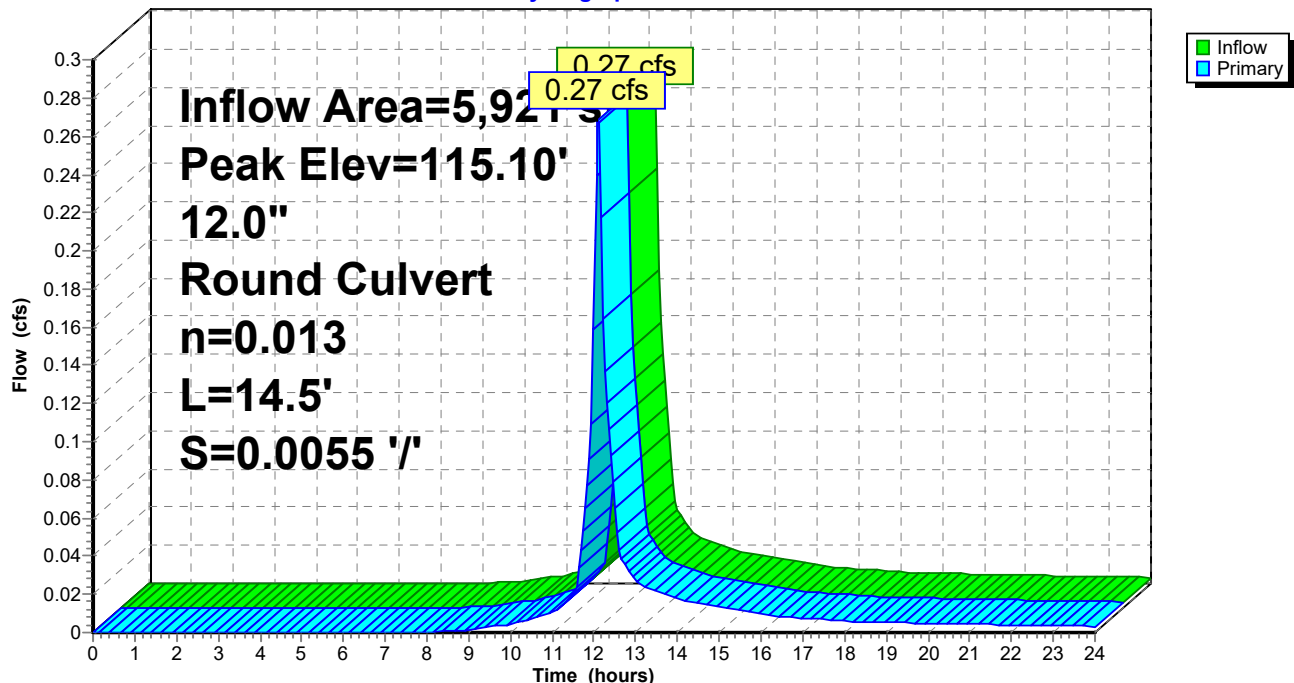
Device	Routing	Invert	Outlet Devices
#1	Primary	114.78'	12.0" Round Culvert L= 14.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.78' / 114.70' S= 0.0055 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.09 hrs HW=115.09' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.26 cfs @ 1.88 fps)

Pond 5P: CB4

Hydrograph



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Stage-Area-Storage for Pond 5P: CB4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.78	0	115.84	0	116.90	0
114.80	0	115.86	0	116.92	0
114.82	0	115.88	0	116.94	0
114.84	0	115.90	0	116.96	0
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0		
115.32	0	116.38	0		
115.34	0	116.40	0		
115.36	0	116.42	0		
115.38	0	116.44	0		
115.40	0	116.46	0		
115.42	0	116.48	0		
115.44	0	116.50	0		
115.46	0	116.52	0		
115.48	0	116.54	0		
115.50	0	116.56	0		
115.52	0	116.58	0		
115.54	0	116.60	0		
115.56	0	116.62	0		
115.58	0	116.64	0		
115.60	0	116.66	0		
115.62	0	116.68	0		
115.64	0	116.70	0		
115.66	0	116.72	0		
115.68	0	116.74	0		
115.70	0	116.76	0		
115.72	0	116.78	0		
115.74	0	116.80	0		
115.76	0	116.82	0		
115.78	0	116.84	0		
115.80	0	116.86	0		
115.82	0	116.88	0		

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Summary for Pond 6P: CDS2

[79] Warning: Submerged Pond 3P Primary device # 1 INLET by 0.18'

[79] Warning: Submerged Pond 5P Primary device # 1 INLET by 0.26'

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 1.82" for 2-Year event
Inflow = 0.38 cfs @ 12.09 hrs, Volume= 1,201 cf
Outflow = 0.38 cfs @ 12.09 hrs, Volume= 1,201 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.09 hrs, Volume= 1,201 cf
Routed to Pond 2P : SUBSURFACE INFILTRATION #2

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

Peak Elev= 115.04' @ 12.09 hrs

Flood Elev= 118.00'

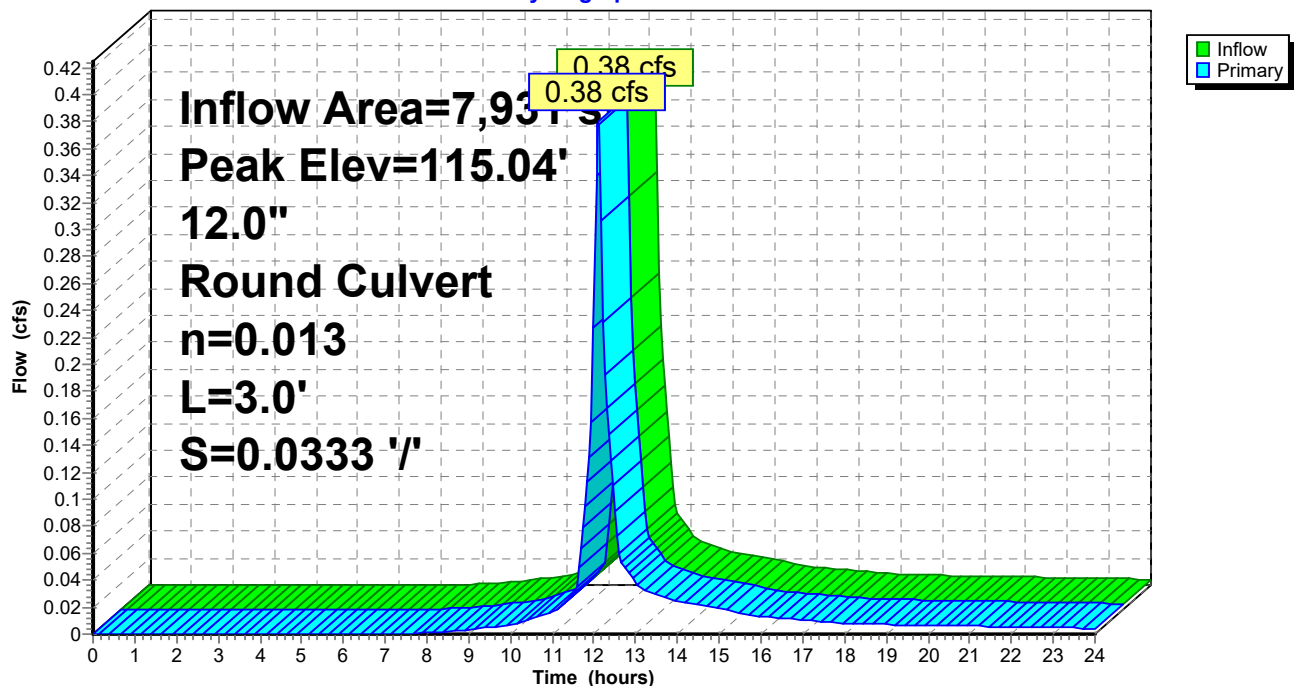
Device	Routing	Invert	Outlet Devices
#1	Primary	114.70'	12.0" Round Culvert L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.70' / 114.60' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.37 cfs @ 12.09 hrs HW=115.04' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.37 cfs @ 1.57 fps)

Pond 6P: CDS2

Hydrograph



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Stage-Area-Storage for Pond 6P: CDS2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.70	0	117.35	0
114.75	0	117.40	0
114.80	0	117.45	0
114.85	0	117.50	0
114.90	0	117.55	0
114.95	0	117.60	0
115.00	0	117.65	0
115.05	0	117.70	0
115.10	0	117.75	0
115.15	0	117.80	0
115.20	0	117.85	0
115.25	0	117.90	0
115.30	0	117.95	0
115.35	0	118.00	0
115.40	0		
115.45	0		
115.50	0		
115.55	0		
115.60	0		
115.65	0		
115.70	0		
115.75	0		
115.80	0		
115.85	0		
115.90	0		
115.95	0		
116.00	0		
116.05	0		
116.10	0		
116.15	0		
116.20	0		
116.25	0		
116.30	0		
116.35	0		
116.40	0		
116.45	0		
116.50	0		
116.55	0		
116.60	0		
116.65	0		
116.70	0		
116.75	0		
116.80	0		
116.85	0		
116.90	0		
116.95	0		
117.00	0		
117.05	0		
117.10	0		
117.15	0		
117.20	0		
117.25	0		
117.30	0		

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Summary for Pond 7P: CB2

Inflow Area = 1,227 sf, 100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.08 cfs @ 12.09 hrs, Volume= 298 cf
Outflow = 0.08 cfs @ 12.09 hrs, Volume= 298 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.09 hrs, Volume= 298 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.33' @ 12.09 hrs

Flood Elev= 122.15'

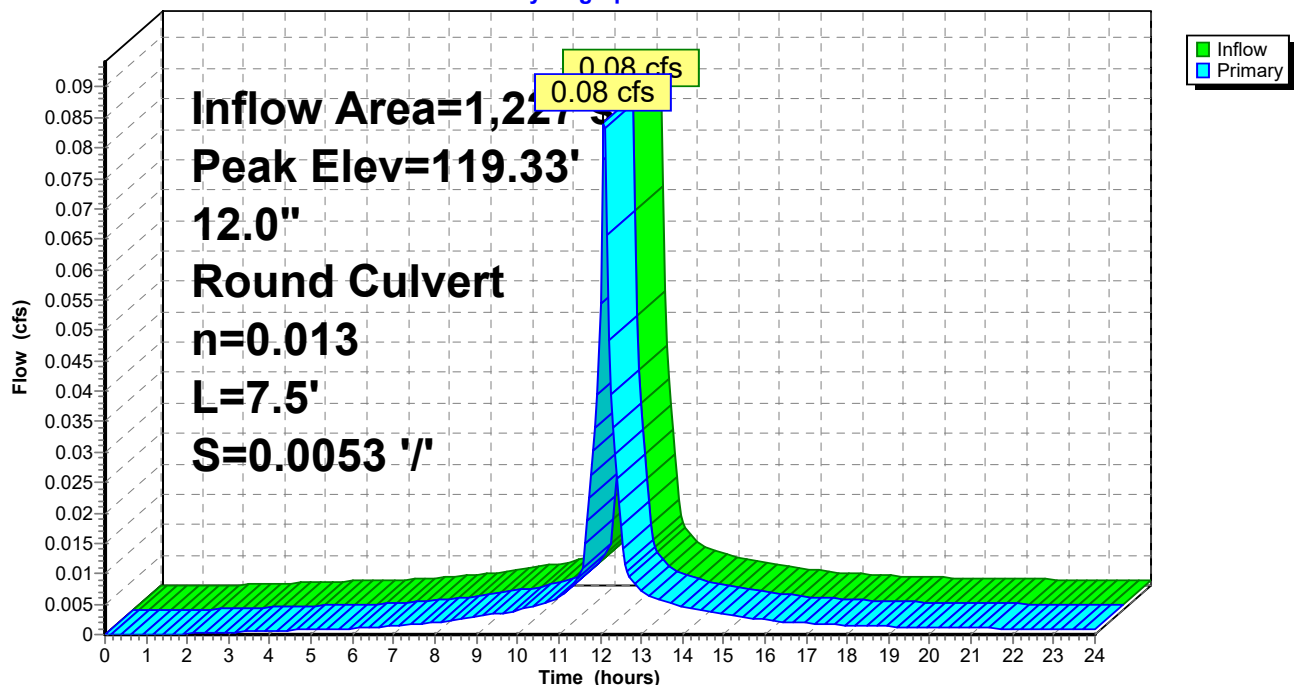
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.09 hrs HW=119.32' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.08 cfs @ 1.35 fps)

Pond 7P: CB2

Hydrograph



POST

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Stage-Area-Storage for Pond 7P: CB2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

POST

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Type III 24-hr 2-Year Rainfall=3.15"

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Summary for Pond 8P: DMH1

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.08'

[79] Warning: Submerged Pond 7P Primary device # 1 INLET by 0.08'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 478 cf
Outflow = 0.13 cfs @ 12.09 hrs, Volume= 478 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.09 hrs, Volume= 478 cf
Routed to Pond 10P : CDS1

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

Peak Elev= 119.23' @ 12.09 hrs

Flood Elev= 122.50'

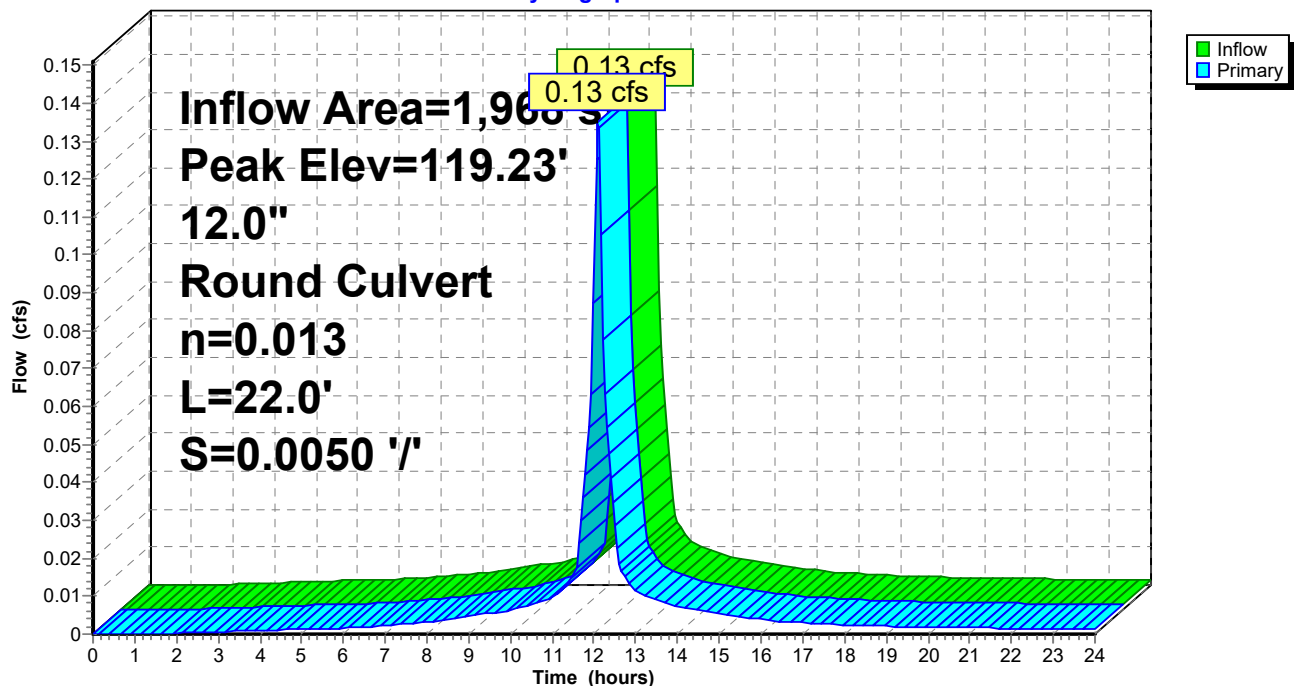
Device	Routing	Invert	Outlet Devices
#1	Primary	119.01'	12.0" Round Culvert L= 22.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.01' / 118.90' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.09 hrs HW=119.23' (Free Discharge)

↑1=Culvert (Barrel Controls 0.13 cfs @ 1.58 fps)

Pond 8P: DMH1

Hydrograph



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Stage-Area-Storage for Pond 8P: DMH1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.01	0	121.66	0
119.06	0	121.71	0
119.11	0	121.76	0
119.16	0	121.81	0
119.21	0	121.86	0
119.26	0	121.91	0
119.31	0	121.96	0
119.36	0	122.01	0
119.41	0	122.06	0
119.46	0	122.11	0
119.51	0	122.16	0
119.56	0	122.21	0
119.61	0	122.26	0
119.66	0	122.31	0
119.71	0	122.36	0
119.76	0	122.41	0
119.81	0	122.46	0
119.86	0		
119.91	0		
119.96	0		
120.01	0		
120.06	0		
120.11	0		
120.16	0		
120.21	0		
120.26	0		
120.31	0		
120.36	0		
120.41	0		
120.46	0		
120.51	0		
120.56	0		
120.61	0		
120.66	0		
120.71	0		
120.76	0		
120.81	0		
120.86	0		
120.91	0		
120.96	0		
121.01	0		
121.06	0		
121.11	0		
121.16	0		
121.21	0		
121.26	0		
121.31	0		
121.36	0		
121.41	0		
121.46	0		
121.51	0		
121.56	0		
121.61	0		

POST

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Type III 24-hr 2-Year Rainfall=3.15"

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Summary for Pond 9P: SUBSURFACE INFILTRATION #3

Inflow Area = 3,048 sf, 100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
 Inflow = 0.21 cfs @ 12.09 hrs, Volume= 741 cf
 Outflow = 0.04 cfs @ 12.53 hrs, Volume= 740 cf, Atten= 81%, Lag= 26.6 min
 Discarded = 0.04 cfs @ 12.53 hrs, Volume= 740 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 115.25' @ 12.53 hrs Surf.Area= 506 sf Storage= 201 cf

Plug-Flow detention time= 32.3 min calculated for 739 cf (100% of inflow)
 Center-of-Mass det. time= 31.8 min (788.2 - 756.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.50'	481 cf	15.75'W x 32.10'L x 3.50'H Field A 1,769 cf Overall - 567 cf Embedded = 1,202 cf x 40.0% Voids
#2A	115.00'	567 cf	ADS_StormTech SC-740 b +Cap x 12 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		1,048 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.50'

Discarded OutFlow Max=0.04 cfs @ 12.53 hrs HW=115.25' (Free Discharge)

↑1=Exfiltration (Controls 0.04 cfs)

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Pond 9P: SUBSURFACE INFILTRATION #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

12 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 567.2 cf Chamber Storage

1,769.3 cf Field - 567.2 cf Chambers = 1,202.1 cf Stone x 40.0% Voids = 480.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,048.1 cf = 0.024 af

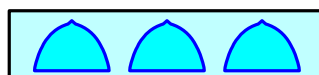
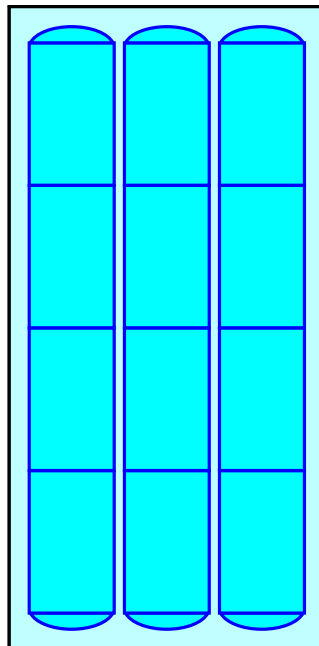
Overall Storage Efficiency = 59.2%

Overall System Size = 32.10' x 15.75' x 3.50'

12 Chambers

65.5 cy Field

44.5 cy Stone



POST

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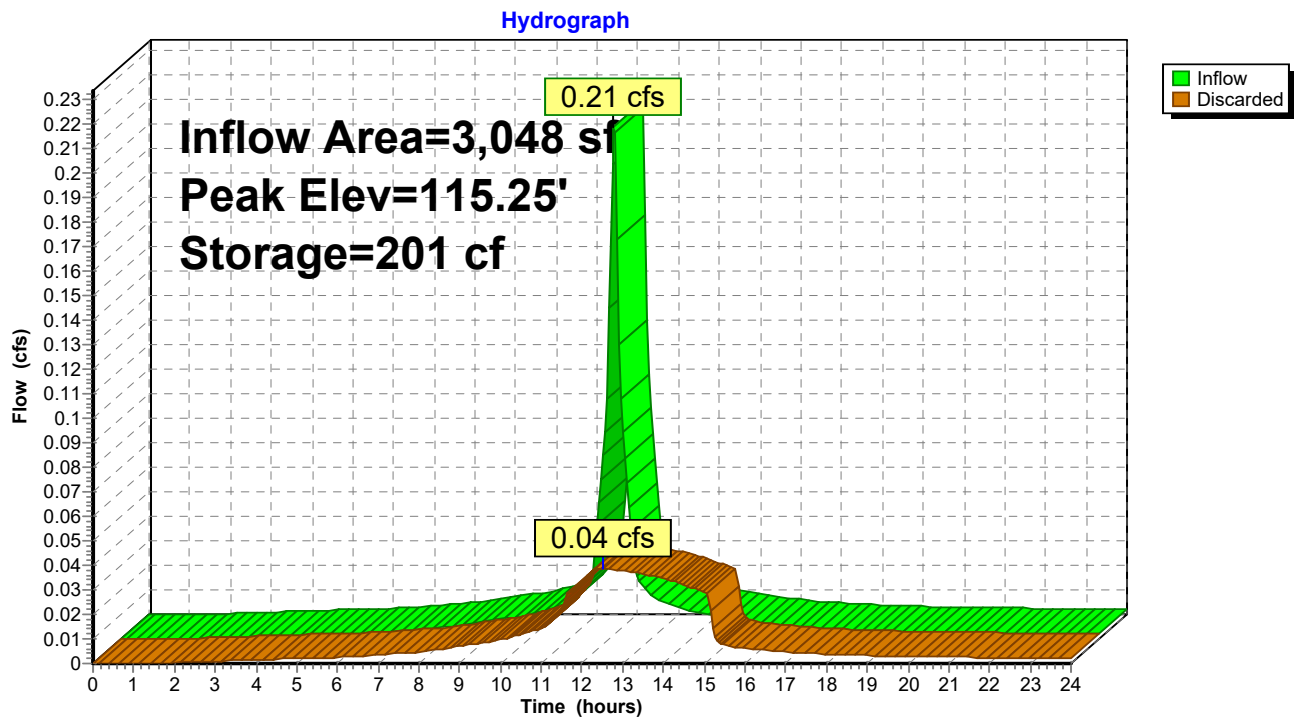
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Pond 9P: SUBSURFACE INFILTRATION #3



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Stage-Area-Storage for Pond 9P: SUBSURFACE INFILTRATION #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.50	506	0	117.15	506	867
114.55	506	10	117.20	506	880
114.60	506	20	117.25	506	892
114.65	506	30	117.30	506	904
114.70	506	40	117.35	506	915
114.75	506	51	117.40	506	926
114.80	506	61	117.45	506	937
114.85	506	71	117.50	506	947
114.90	506	81	117.55	506	957
114.95	506	91	117.60	506	967
115.00	506	101	117.65	506	977
115.05	506	121	117.70	506	987
115.10	506	141	117.75	506	998
115.15	506	161	117.80	506	1,008
115.20	506	181	117.85	506	1,018
115.25	506	200	117.90	506	1,028
115.30	506	220	117.95	506	1,038
115.35	506	240	118.00	506	1,048
115.40	506	259			
115.45	506	279			
115.50	506	298			
115.55	506	318			
115.60	506	337			
115.65	506	356			
115.70	506	375			
115.75	506	394			
115.80	506	413			
115.85	506	432			
115.90	506	451			
115.95	506	469			
116.00	506	488			
116.05	506	506			
116.10	506	524			
116.15	506	543			
116.20	506	561			
116.25	506	578			
116.30	506	596			
116.35	506	614			
116.40	506	631			
116.45	506	648			
116.50	506	665			
116.55	506	682			
116.60	506	699			
116.65	506	716			
116.70	506	732			
116.75	506	748			
116.80	506	764			
116.85	506	779			
116.90	506	795			
116.95	506	810			
117.00	506	825			
117.05	506	839			
117.10	506	853			

POST

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Summary for Pond 10P: CDS1

[79] Warning: Submerged Pond 8P Primary device # 1 OUTLET by 0.11'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 478 cf
Outflow = 0.13 cfs @ 12.09 hrs, Volume= 478 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.09 hrs, Volume= 478 cf
Routed to Pond 4P : SUBSURFACE INFILTRATION #1

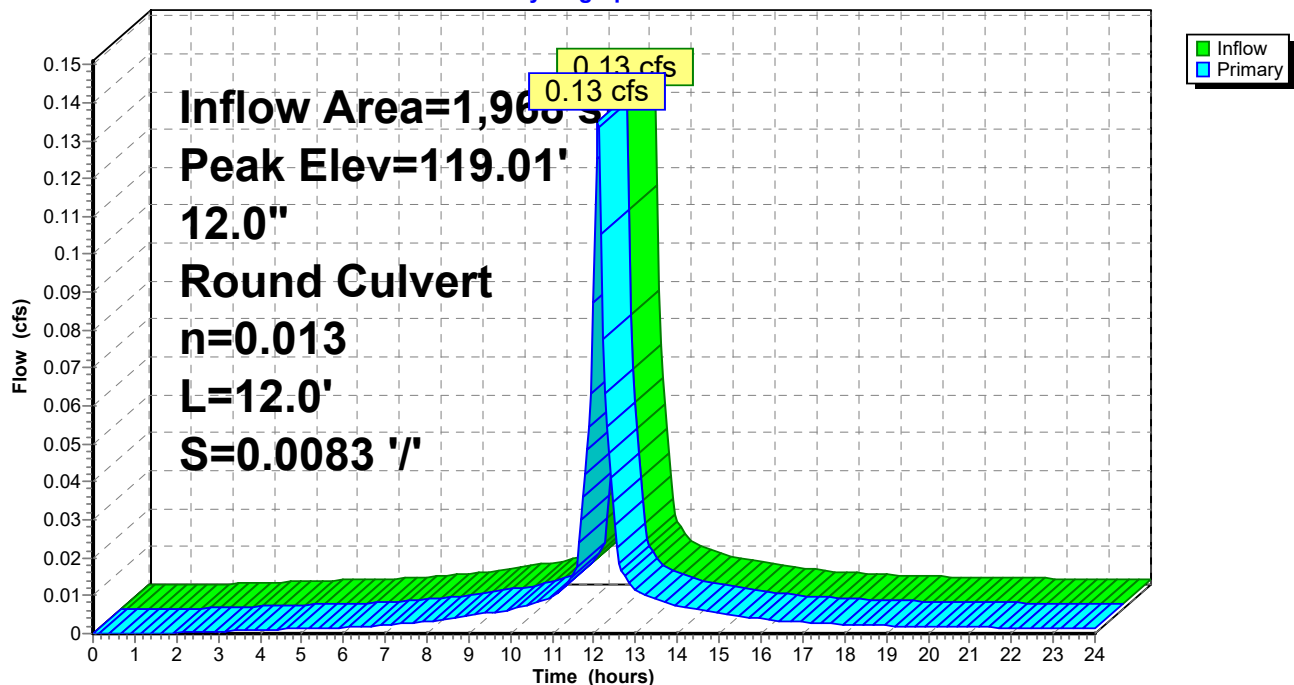
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 119.01' @ 12.09 hrs
Flood Elev= 122.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.80'	12.0" Round Culvert L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.80' / 118.70' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.09 hrs HW=119.00' (Free Discharge)
1=Culvert (Barrel Controls 0.13 cfs @ 1.72 fps)

Pond 10P: CDS1

Hydrograph



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Stage-Area-Storage for Pond 10P: CDS1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
118.80	0	121.45	0
118.85	0	121.50	0
118.90	0	121.55	0
118.95	0	121.60	0
119.00	0	121.65	0
119.05	0	121.70	0
119.10	0	121.75	0
119.15	0	121.80	0
119.20	0	121.85	0
119.25	0	121.90	0
119.30	0	121.95	0
119.35	0	122.00	0
119.40	0	122.05	0
119.45	0	122.10	0
119.50	0	122.15	0
119.55	0	122.20	0
119.60	0	122.25	0
119.65	0	122.30	0
119.70	0	122.35	0
119.75	0	122.40	0
119.80	0	122.45	0
119.85	0	122.50	0
119.90	0		
119.95	0		
120.00	0		
120.05	0		
120.10	0		
120.15	0		
120.20	0		
120.25	0		
120.30	0		
120.35	0		
120.40	0		
120.45	0		
120.50	0		
120.55	0		
120.60	0		
120.65	0		
120.70	0		
120.75	0		
120.80	0		
120.85	0		
120.90	0		
120.95	0		
121.00	0		
121.05	0		
121.10	0		
121.15	0		
121.20	0		
121.25	0		
121.30	0		
121.35	0		
121.40	0		

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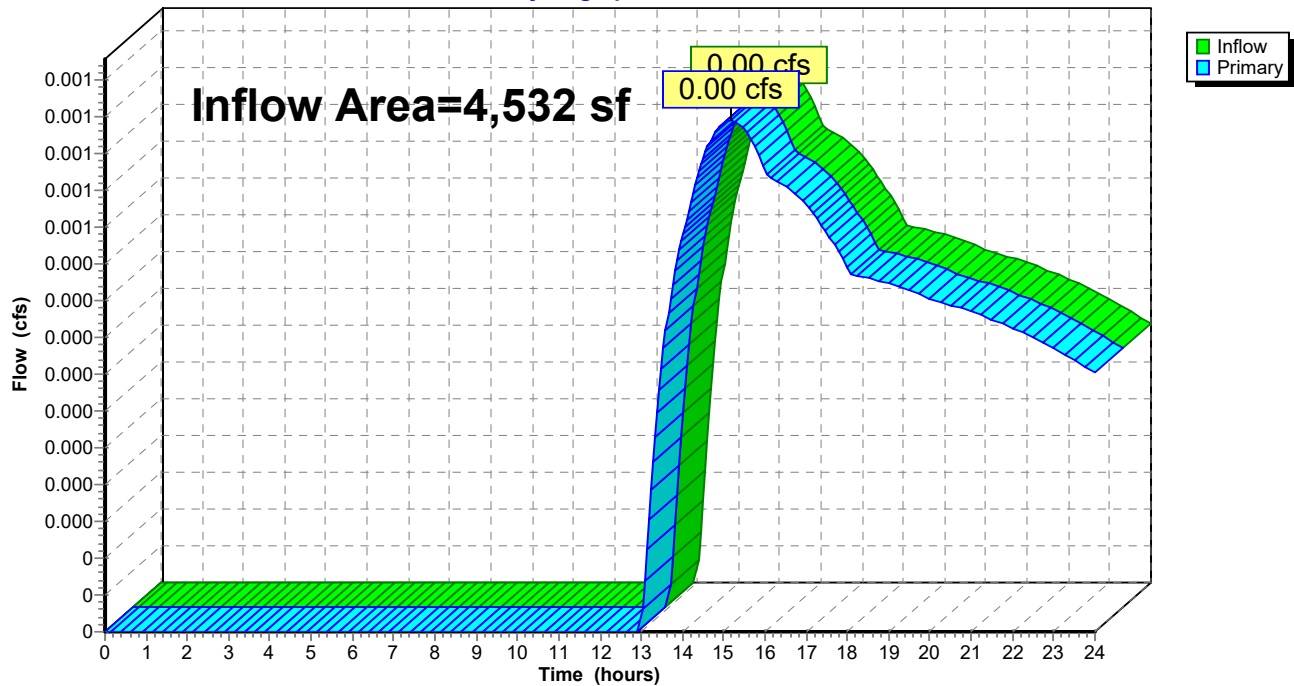
Summary for Link DP1: link

Inflow Area = 4,532 sf, 12.29% Impervious, Inflow Depth > 0.05" for 2-Year event
Inflow = 0.00 cfs @ 15.17 hrs, Volume= 19 cf
Primary = 0.00 cfs @ 15.17 hrs, Volume= 19 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link

Hydrograph



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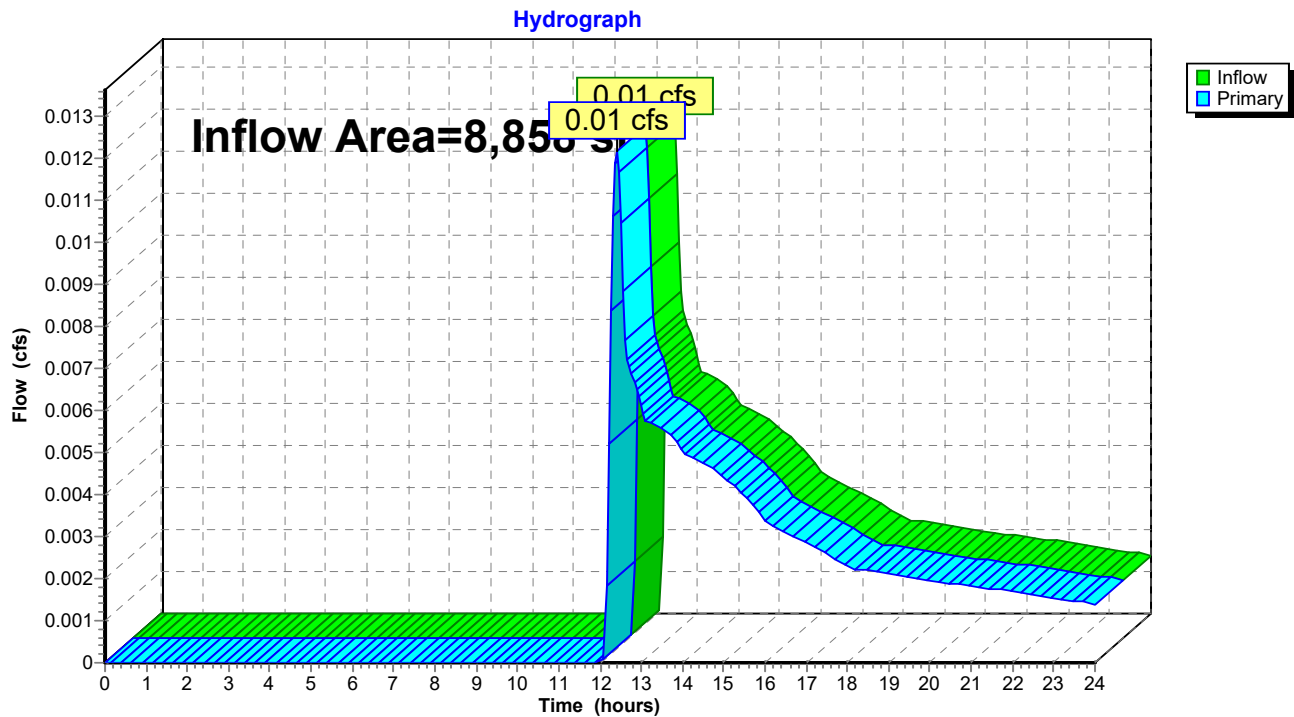
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Summary for Link DP2: link

Inflow Area = 8,858 sf, 24.43% Impervious, Inflow Depth > 0.18" for 2-Year event
Inflow = 0.01 cfs @ 12.39 hrs, Volume= 136 cf
Primary = 0.01 cfs @ 12.39 hrs, Volume= 136 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link



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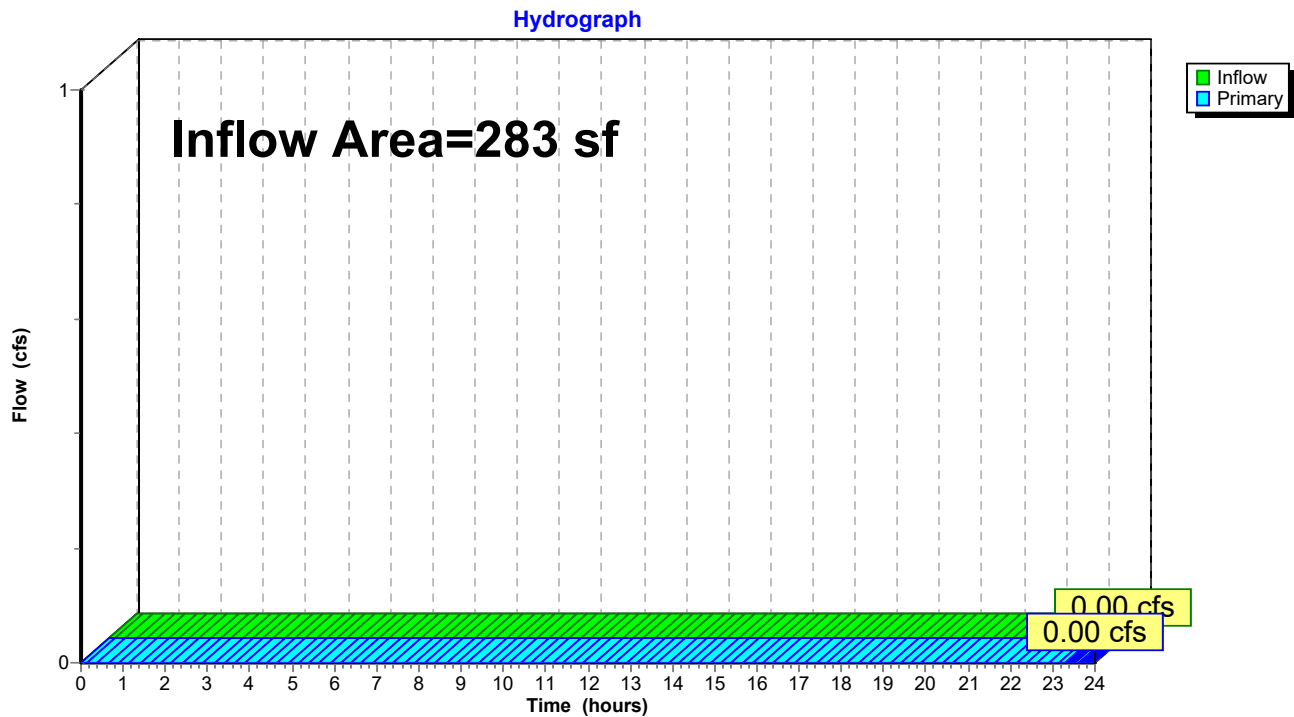
Page 47

Summary for Link DP3: link

Inflow Area = 283 sf, 0.00% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP3: link



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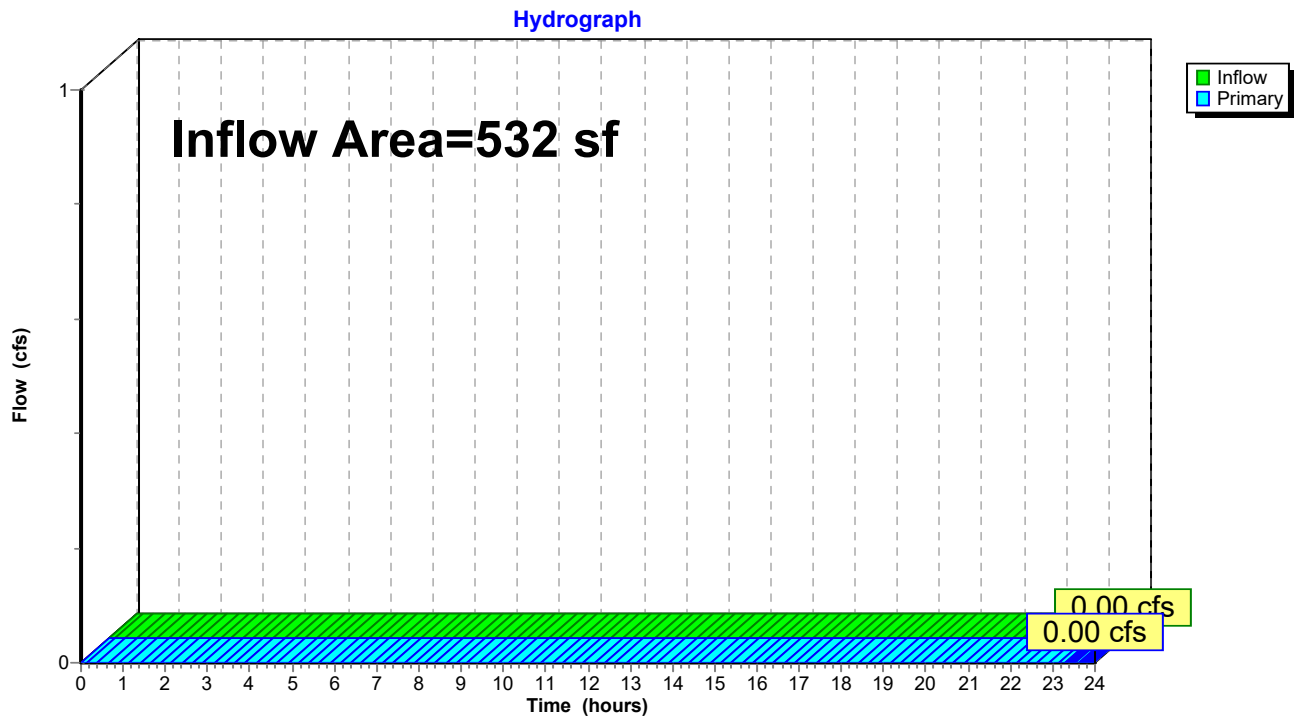
Page 48

Summary for Link DP4: link

Inflow Area = 532 sf, 0.00% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link



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Type III 24-hr 10-Year Rainfall=4.83"

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

SubcatchmentP1: P1	Runoff Area=4,532 sf 12.29% Impervious Runoff Depth>0.43" Tc=6.0 min CN=46 Runoff=0.02 cfs 163 cf
SubcatchmentP2: P2	Runoff Area=8,858 sf 24.43% Impervious Runoff Depth>0.78" Tc=6.0 min CN=53 Runoff=0.13 cfs 577 cf
SubcatchmentP3: P3	Runoff Area=283 sf 0.00% Impervious Runoff Depth>0.17" Tc=6.0 min CN=39 Runoff=0.00 cfs 4 cf
SubcatchmentP4: P4A	Runoff Area=532 sf 0.00% Impervious Runoff Depth>0.17" Tc=6.0 min CN=39 Runoff=0.00 cfs 7 cf
SubcatchmentP5A: P5A	Runoff Area=1,227 sf 100.00% Impervious Runoff Depth>4.59" Tc=6.0 min CN=98 Runoff=0.13 cfs 469 cf
SubcatchmentP5B: P5B	Runoff Area=741 sf 100.00% Impervious Runoff Depth>4.59" Tc=6.0 min CN=98 Runoff=0.08 cfs 283 cf
SubcatchmentP6A: P6A	Runoff Area=2,010 sf 85.82% Impervious Runoff Depth>3.71" Tc=6.0 min CN=90 Runoff=0.19 cfs 621 cf
SubcatchmentP6B: P6B	Runoff Area=5,921 sf 77.35% Impervious Runoff Depth>3.21" Tc=6.0 min CN=85 Runoff=0.50 cfs 1,583 cf
SubcatchmentP7: P7	Runoff Area=3,048 sf 100.00% Impervious Runoff Depth>4.59" Tc=6.0 min CN=98 Runoff=0.32 cfs 1,166 cf
Pond 1P: CB1	Peak Elev=119.32' Inflow=0.08 cfs 283 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 '/' Outflow=0.08 cfs 283 cf
Pond 2P: SUBSURFACE INFILTRATION #2	Peak Elev=114.82' Storage=673 cf Inflow=0.69 cfs 2,205 cf Outflow=0.12 cfs 2,203 cf
Pond 3P: CB3	Peak Elev=115.12' Inflow=0.19 cfs 621 cf 12.0" Round Culvert n=0.013 L=30.5' S=0.0052 '/' Outflow=0.19 cfs 621 cf
Pond 4P: SUBSURFACE INFILTRATION #1	Peak Elev=119.63' Storage=250 cf Inflow=0.21 cfs 753 cf Outflow=0.03 cfs 752 cf
Pond 5P: CB4	Peak Elev=115.22' Inflow=0.50 cfs 1,583 cf 12.0" Round Culvert n=0.013 L=14.5' S=0.0055 '/' Outflow=0.50 cfs 1,583 cf
Pond 6P: CDS2	Peak Elev=115.19' Inflow=0.69 cfs 2,205 cf 12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=0.69 cfs 2,205 cf
Pond 7P: CB2	Peak Elev=119.37' Inflow=0.13 cfs 469 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 '/' Outflow=0.13 cfs 469 cf

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Pond 8P: DMH1

Peak Elev=119.29' Inflow=0.21 cfs 753 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0050 '/ Outflow=0.21 cfs 753 cf

Pond 9P: SUBSURFACE INFILTRATION #3

Peak Elev=115.68' Storage=368 cf Inflow=0.32 cfs 1,166 cf
Outflow=0.04 cfs 1,165 cf

Pond 10P: CDS1

Peak Elev=119.06' Inflow=0.21 cfs 753 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 '/ Outflow=0.21 cfs 753 cf

Link DP1: link

Inflow=0.02 cfs 163 cf
Primary=0.02 cfs 163 cf

Link DP2: link

Inflow=0.13 cfs 577 cf
Primary=0.13 cfs 577 cf

Link DP3: link

Inflow=0.00 cfs 4 cf
Primary=0.00 cfs 4 cf

Link DP4: link

Inflow=0.00 cfs 7 cf
Primary=0.00 cfs 7 cf

Total Runoff Area = 27,152 sf Runoff Volume = 4,875 cf Average Runoff Depth = 2.15"
48.28% Pervious = 13,110 sf 51.72% Impervious = 14,042 sf

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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment P1: P1

Runoff = 0.02 cfs @ 12.30 hrs, Volume= 163 cf, Depth> 0.43"
Routed to Link DP1 : link

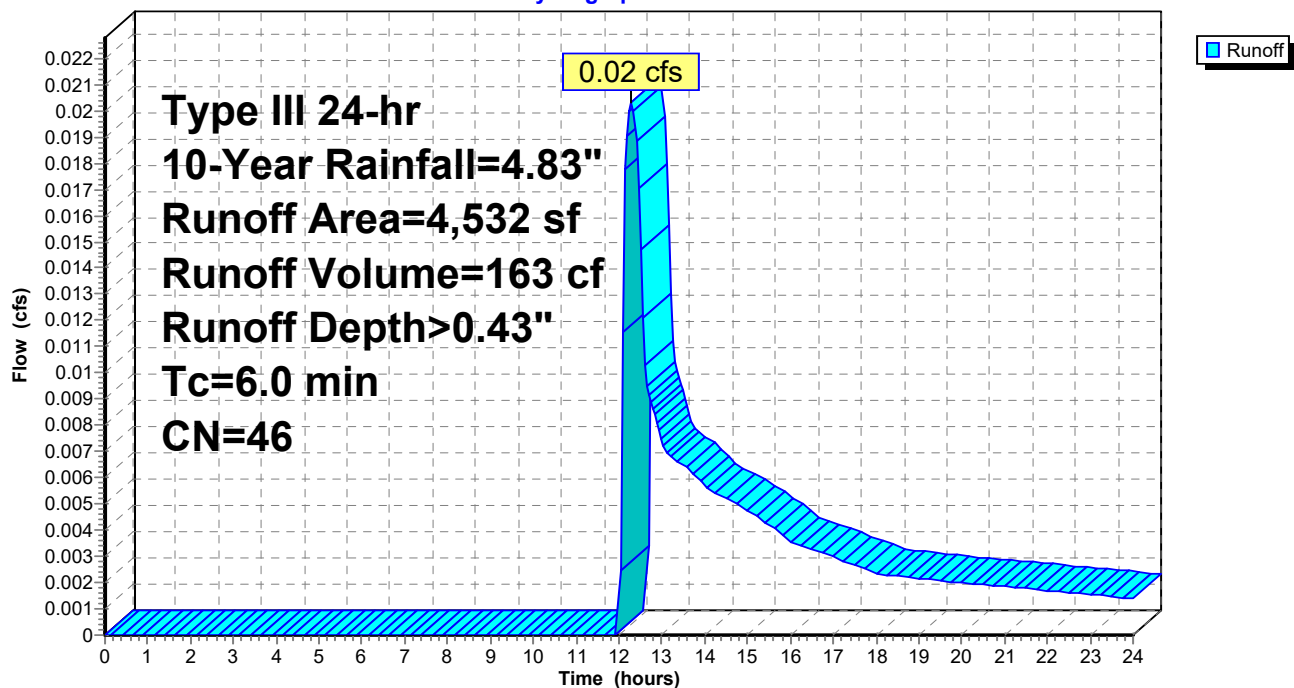
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
557	98	Roofs, HSG A
3,975	39	>75% Grass cover, Good, HSG A
4,532	46	Weighted Average
3,975		87.71% Pervious Area
557		12.29% Impervious Area

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

Subcatchment P1: P1

Hydrograph



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Summary for Subcatchment P2: P2

Runoff = 0.13 cfs @ 12.12 hrs, Volume= 577 cf, Depth> 0.78"
Routed to Link DP2 : link

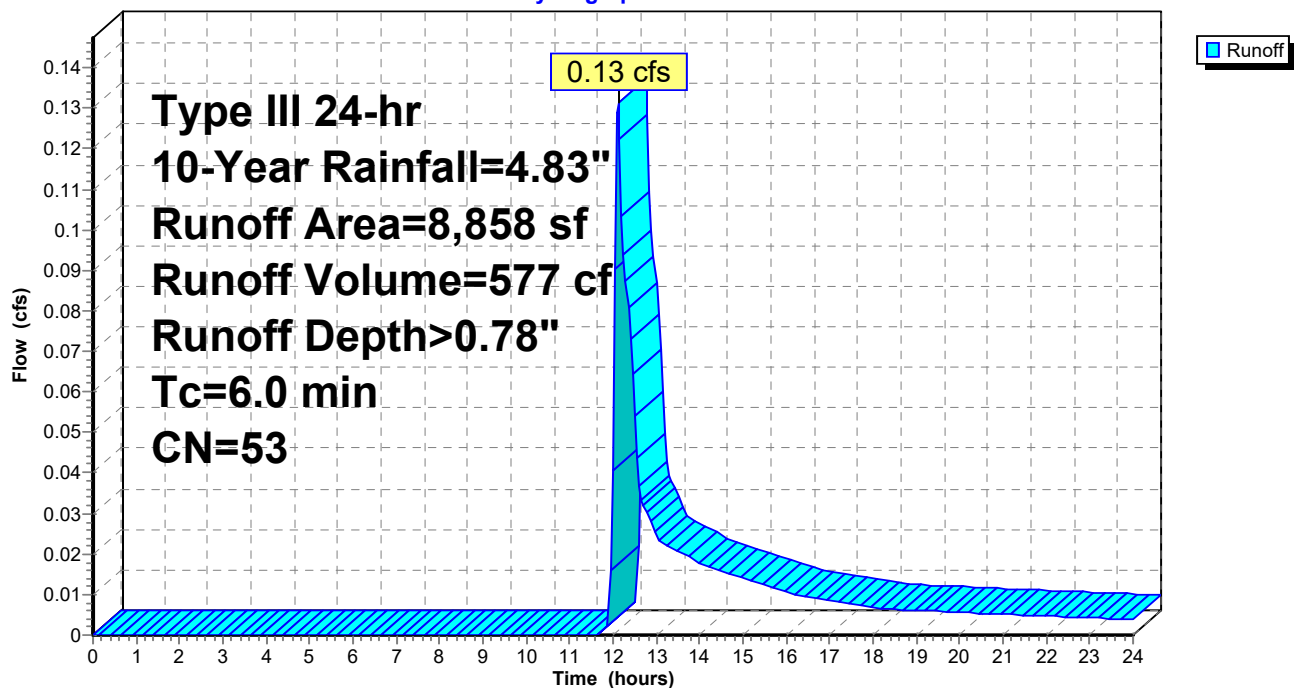
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
2,164	98	Roofs, HSG A
6,694	39	>75% Grass cover, Good, HSG A
8,858	53	Weighted Average
6,694		75.57% Pervious Area
2,164		24.43% Impervious Area

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

Subcatchment P2: P2

Hydrograph



POST

Summary for Subcatchment P3: P3

Runoff = 0.00 cfs @ 13.65 hrs, Volume= 4 cf, Depth> 0.17"
Routed to Link DP3 : link

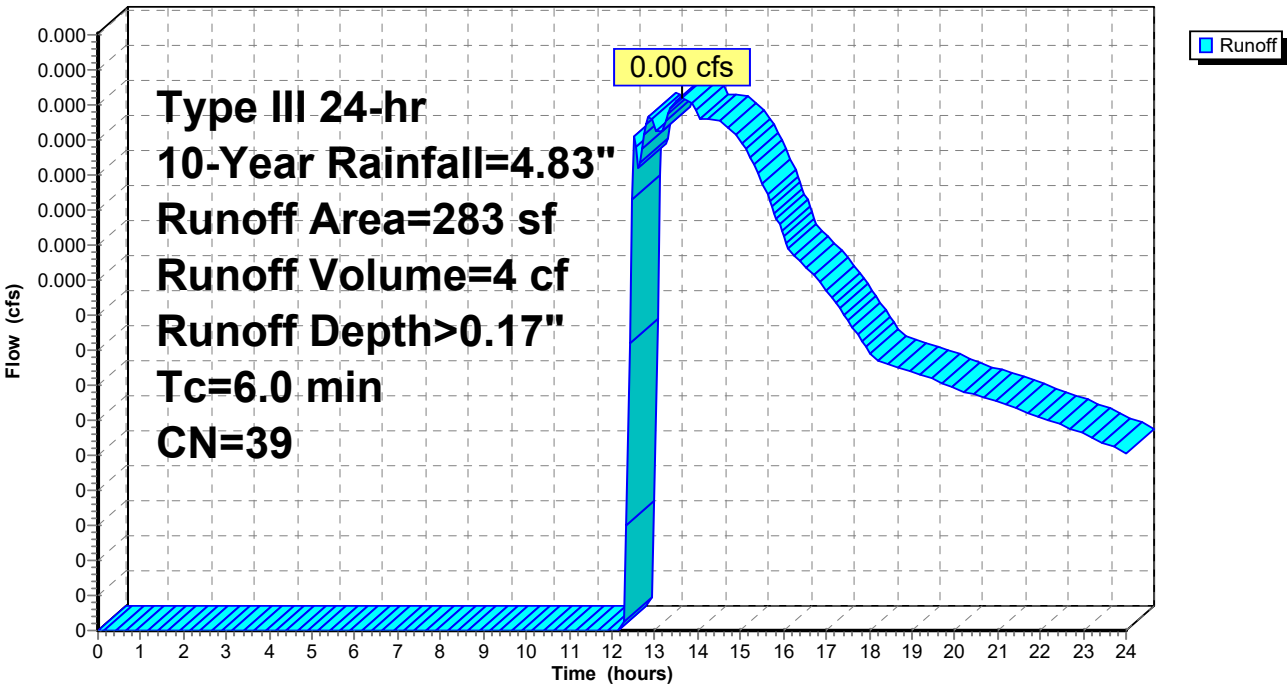
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
283	39	>75% Grass cover, Good, HSG A
283		100.00% Pervious Area

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

Subcatchment P3: P3

Hydrograph



Summary for Subcatchment P4: P4A

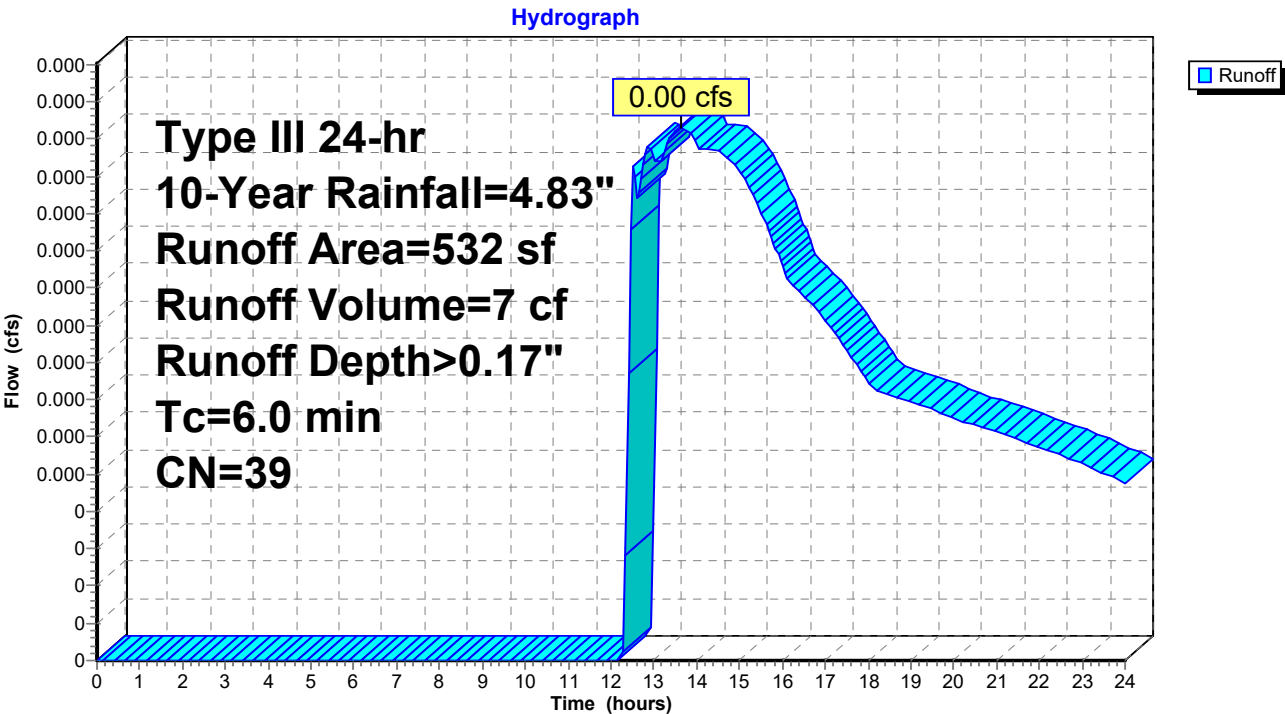
Runoff = 0.00 cfs @ 13.65 hrs, Volume= 7 cf, Depth> 0.17"
Routed to Link DP4 : link

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
532	39	>75% Grass cover, Good, HSG A
532		100.00% Pervious Area

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

Subcatchment P4: P4A



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Summary for Subcatchment P5A: P5A

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 469 cf, Depth> 4.59"
Routed to Pond 7P : CB2

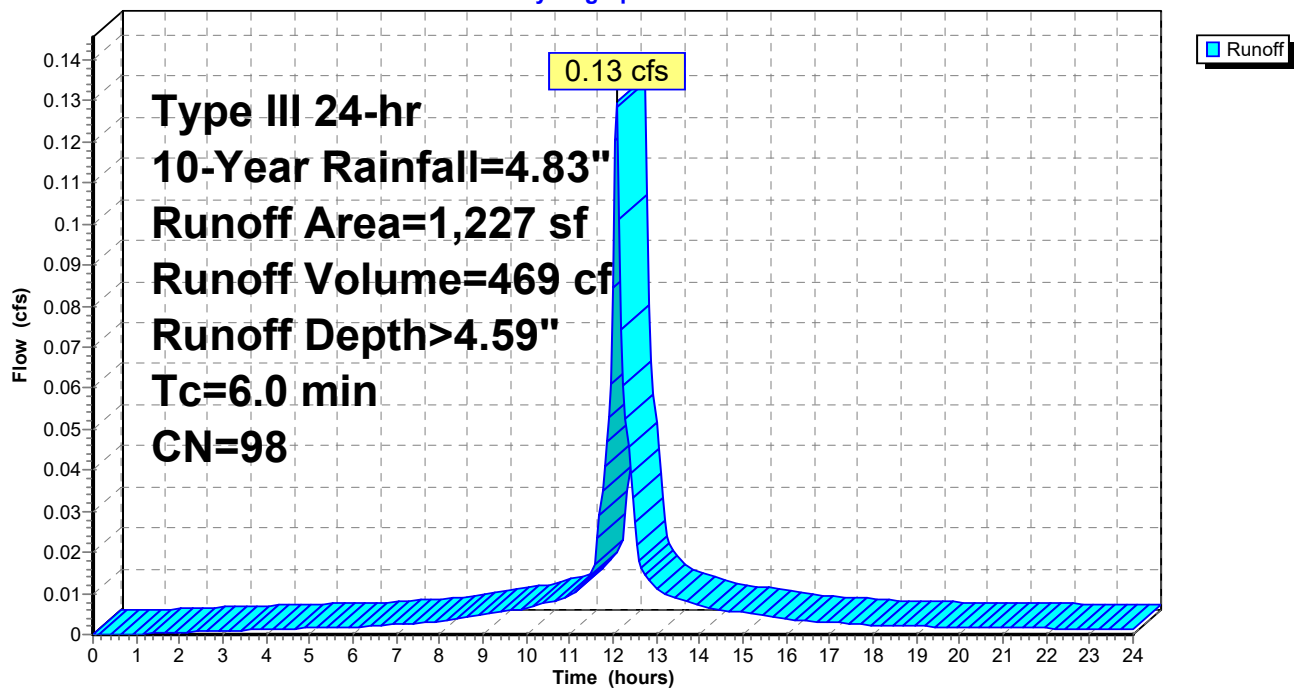
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,227	98	Paved parking, HSG A
1,227		100.00% Impervious Area

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

Subcatchment P5A: P5A

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment P5B: P5B

Runoff = 0.08 cfs @ 12.09 hrs, Volume= 283 cf, Depth> 4.59"
Routed to Pond 1P : CB1

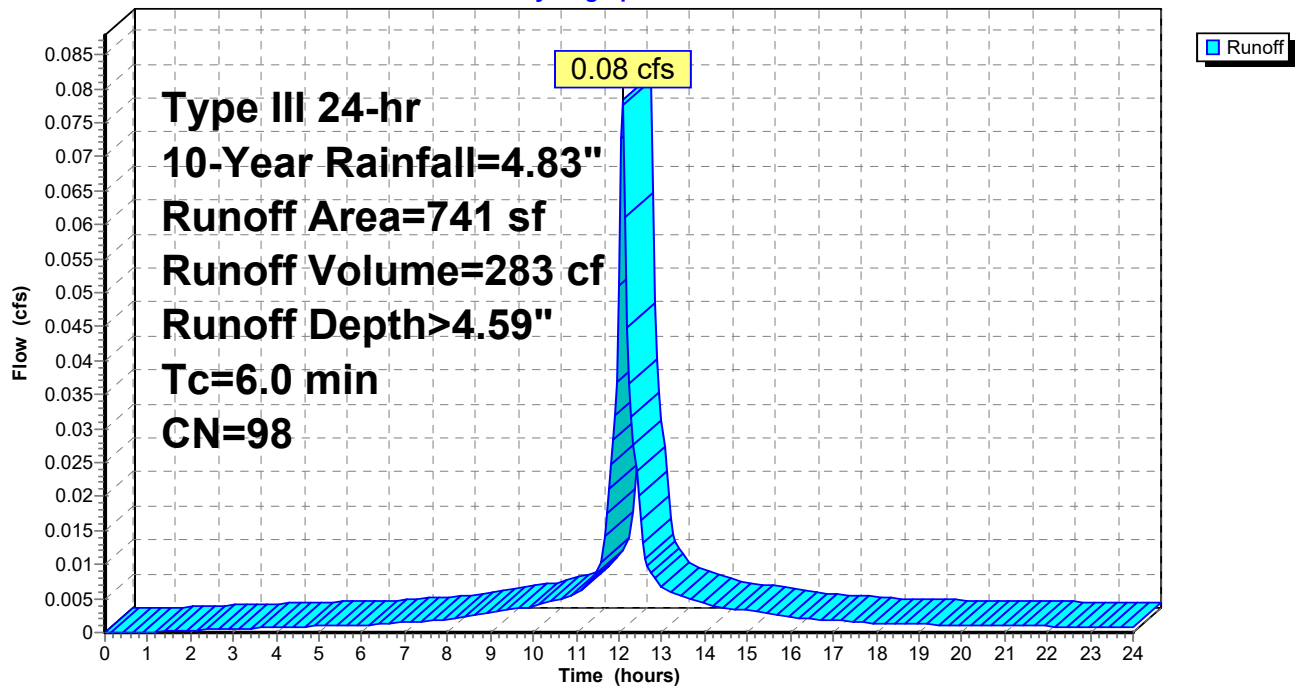
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
741	98	Paved parking, HSG A
741		100.00% Impervious Area

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

Subcatchment P5B: P5B

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment P6A: P6A

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 621 cf, Depth> 3.71"
Routed to Pond 3P : CB3

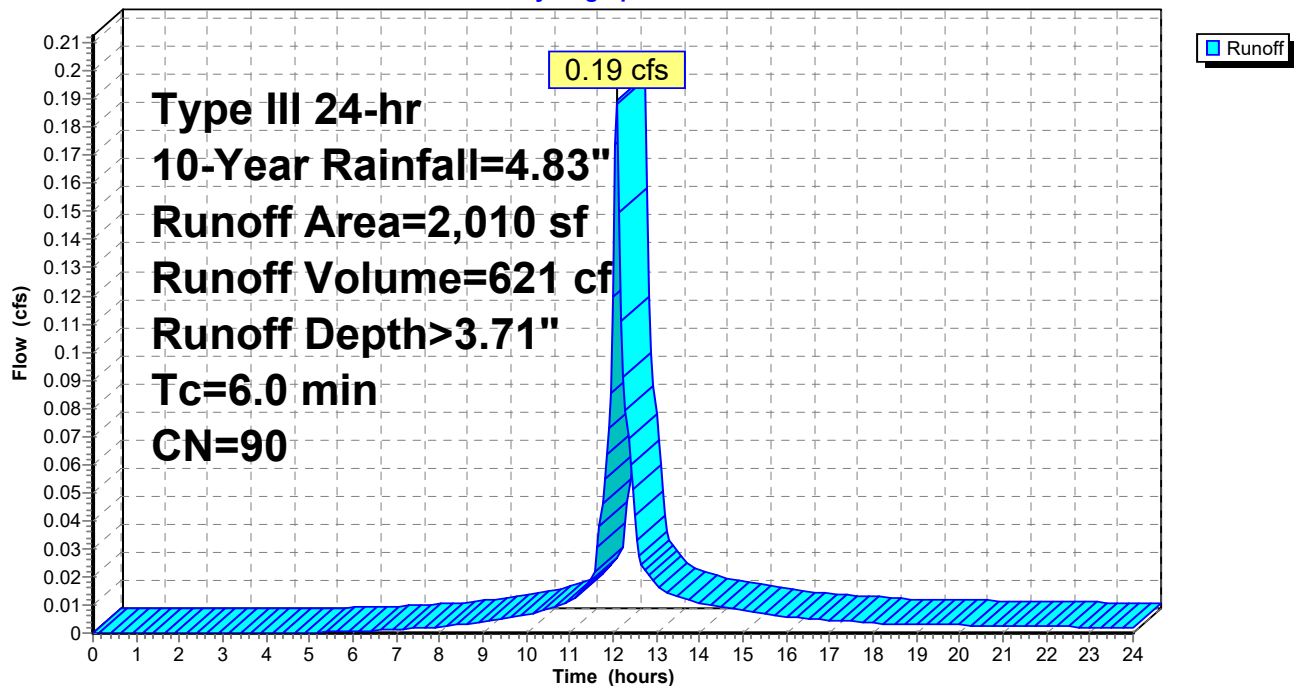
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
285	39	>75% Grass cover, Good, HSG A
1,725	98	Paved parking, HSG A
2,010	90	Weighted Average
285		14.18% Pervious Area
1,725		85.82% Impervious Area

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

Subcatchment P6A: P6A

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment P6B: P6B

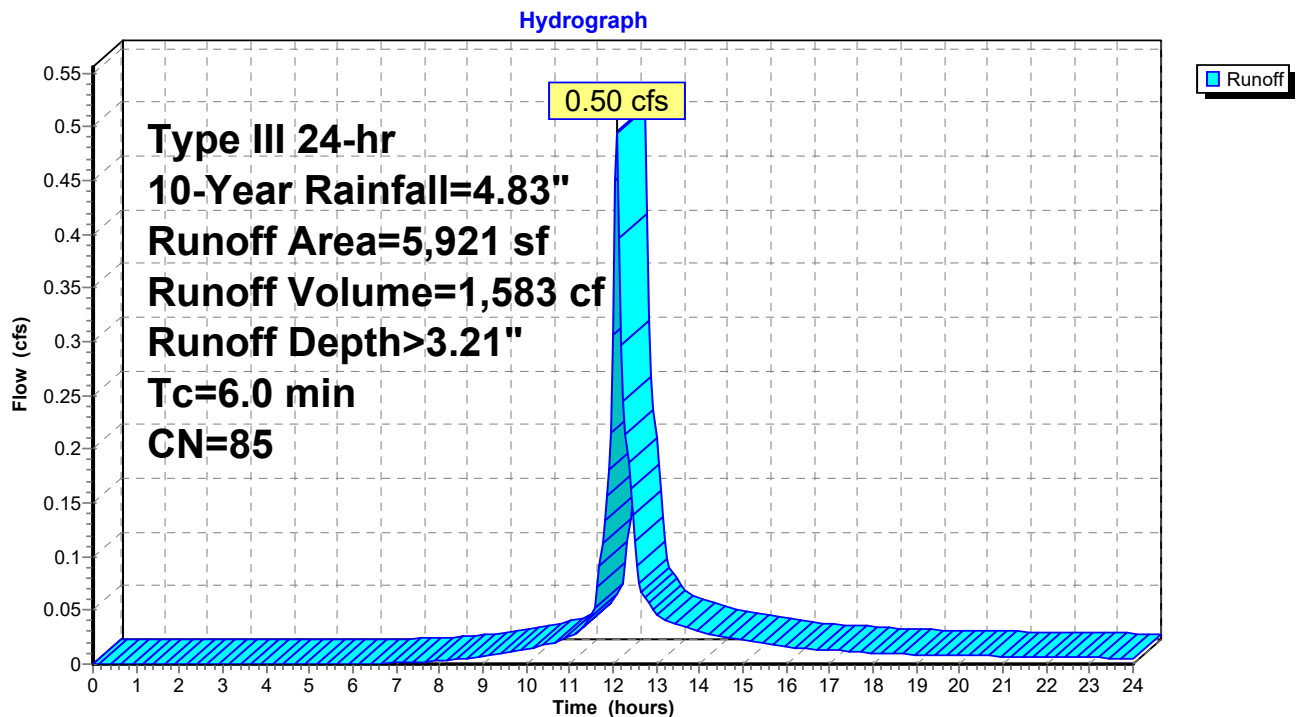
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 1,583 cf, Depth> 3.21"
Routed to Pond 5P : CB4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,341	39	>75% Grass cover, Good, HSG A
4,580	98	Paved parking, HSG A
5,921	85	Weighted Average
1,341		22.65% Pervious Area
4,580		77.35% Impervious Area

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

Subcatchment P6B: P6B



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment P7: P7

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,166 cf, Depth> 4.59"
Routed to Pond 9P : SUBSURFACE INFILTRATION #3

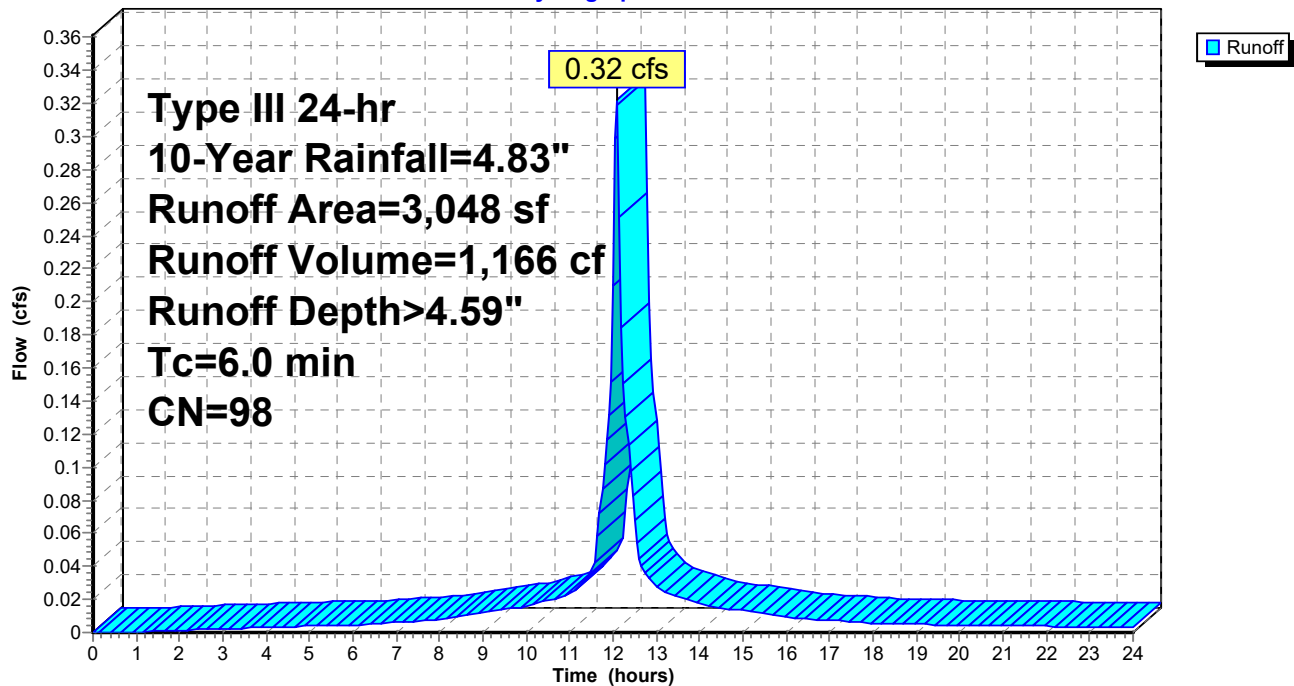
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
3,048	98	Roofs, HSG A
3,048		100.00% Impervious Area

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

Subcatchment P7: P7

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Pond 1P: CB1

Inflow Area = 741 sf, 100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.08 cfs @ 12.09 hrs, Volume= 283 cf
Outflow = 0.08 cfs @ 12.09 hrs, Volume= 283 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.09 hrs, Volume= 283 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.32' @ 12.09 hrs

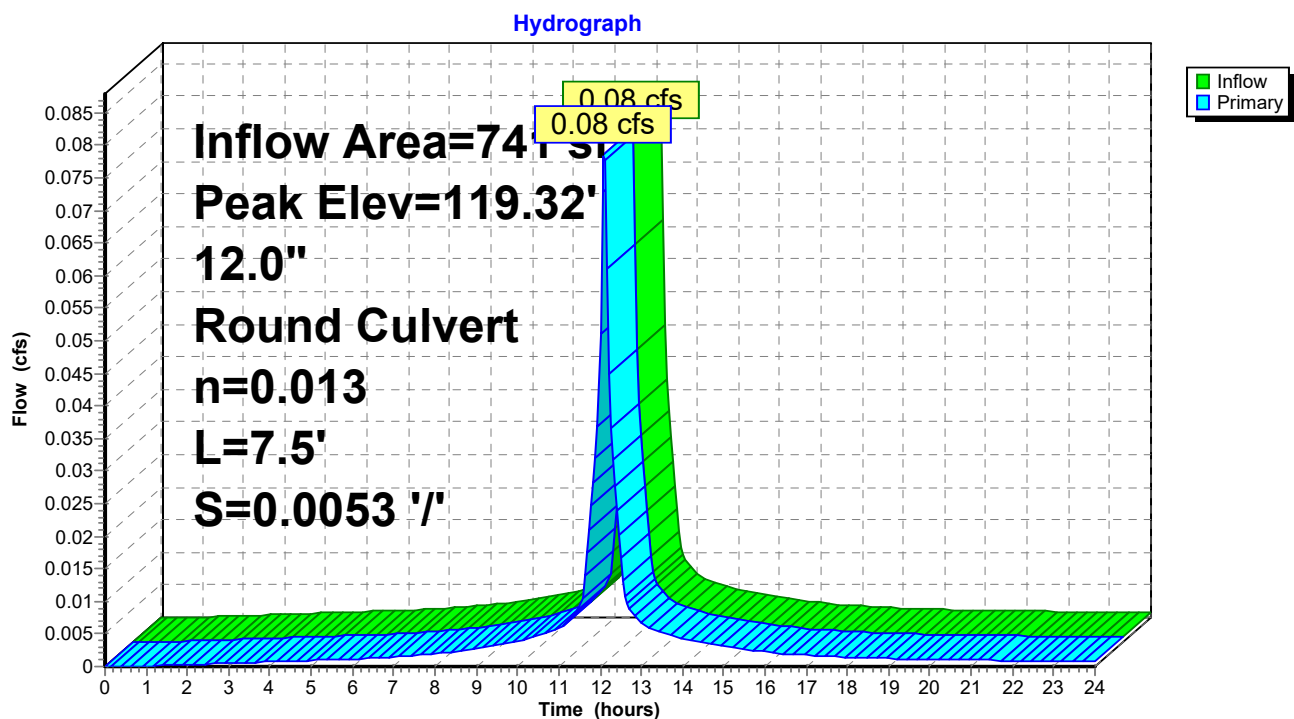
Flood Elev= 122.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.09 hrs HW=119.32' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 0.08 cfs @ 1.33 fps)

Pond 1P: CB1



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Type III 24-hr 10-Year Rainfall=4.83"

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Stage-Area-Storage for Pond 1P: CB1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

POST

Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Pond 2P: SUBSURFACE INFILTRATION #2

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.12'

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 3.34" for 10-Year event
 Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,205 cf
 Outflow = 0.12 cfs @ 12.57 hrs, Volume= 2,203 cf, Atten= 83%, Lag= 28.6 min
 Primary = 0.12 cfs @ 12.57 hrs, Volume= 2,203 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 114.82' @ 12.57 hrs Surf.Area= 1,494 sf Storage= 673 cf

Plug-Flow detention time= 40.4 min calculated for 2,199 cf (100% of inflow)
 Center-of-Mass det. time= 40.0 min (843.6 - 803.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.00'	1,064 cf	28.17'W x 53.04'L x 2.33'H Field A 3,486 cf Overall - 826 cf Embedded = 2,660 cf x 40.0% Voids
#2A	114.50'	826 cf	ADS_StormTech SC-310 +Cap x 56 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
		1,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	114.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.00'

Primary OutFlow Max=0.12 cfs @ 12.57 hrs HW=114.82' (Free Discharge)
 ↑ **1=Exfiltration** (Controls 0.12 cfs)

POST

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Type III 24-hr 10-Year Rainfall=4.83"

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Pond 2P: SUBSURFACE INFILTRATION #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

8 Rows x 34.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 28.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

56 Chambers x 14.7 cf = 825.5 cf Chamber Storage

3,485.9 cf Field - 825.5 cf Chambers = 2,660.4 cf Stone x 40.0% Voids = 1,064.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,889.7 cf = 0.043 af

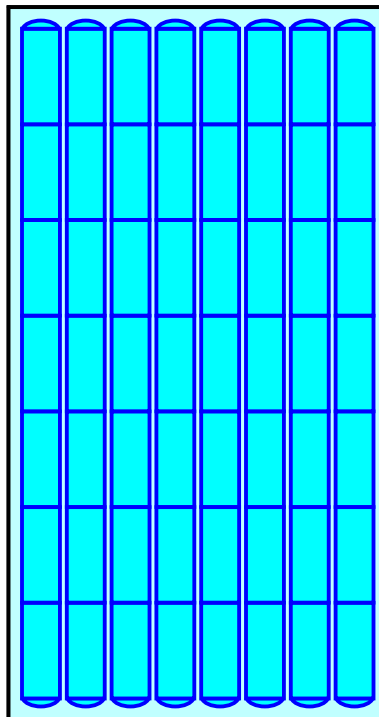
Overall Storage Efficiency = 54.2%

Overall System Size = 53.04' x 28.17' x 2.33'

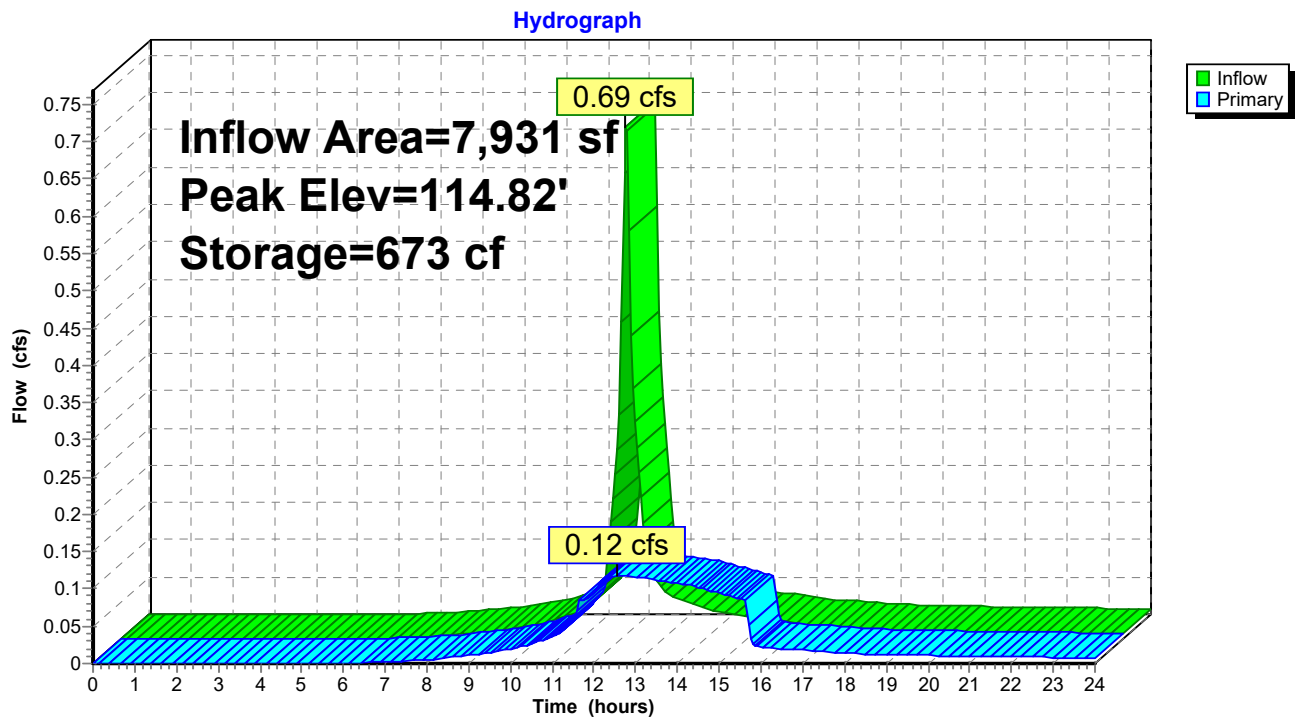
56 Chambers

129.1 cy Field

98.5 cy Stone



Pond 2P: SUBSURFACE INFILTRATION #2



POST*Type III 24-hr 10-Year Rainfall=4.83"*

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Stage-Area-Storage for Pond 2P: SUBSURFACE INFILTRATION #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.00	1,494	0
114.05	1,494	30
114.10	1,494	60
114.15	1,494	90
114.20	1,494	120
114.25	1,494	149
114.30	1,494	179
114.35	1,494	209
114.40	1,494	239
114.45	1,494	269
114.50	1,494	299
114.55	1,494	357
114.60	1,494	416
114.65	1,494	474
114.70	1,494	532
114.75	1,494	589
114.80	1,494	646
114.85	1,494	702
114.90	1,494	757
114.95	1,494	812
115.00	1,494	866
115.05	1,494	920
115.10	1,494	973
115.15	1,494	1,024
115.20	1,494	1,075
115.25	1,494	1,125
115.30	1,494	1,174
115.35	1,494	1,222
115.40	1,494	1,268
115.45	1,494	1,313
115.50	1,494	1,357
115.55	1,494	1,398
115.60	1,494	1,436
115.65	1,494	1,473
115.70	1,494	1,507
115.75	1,494	1,539
115.80	1,494	1,571
115.85	1,494	1,601
115.90	1,494	1,631
115.95	1,494	1,661
116.00	1,494	1,690
116.05	1,494	1,720
116.10	1,494	1,750
116.15	1,494	1,780
116.20	1,494	1,810
116.25	1,494	1,840
116.30	1,494	1,870

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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Pond 3P: CB3

Inflow Area = 2,010 sf, 85.82% Impervious, Inflow Depth > 3.71" for 10-Year event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 621 cf
Outflow = 0.19 cfs @ 12.09 hrs, Volume= 621 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.09 hrs, Volume= 621 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.12' @ 12.09 hrs

Flood Elev= 118.00'

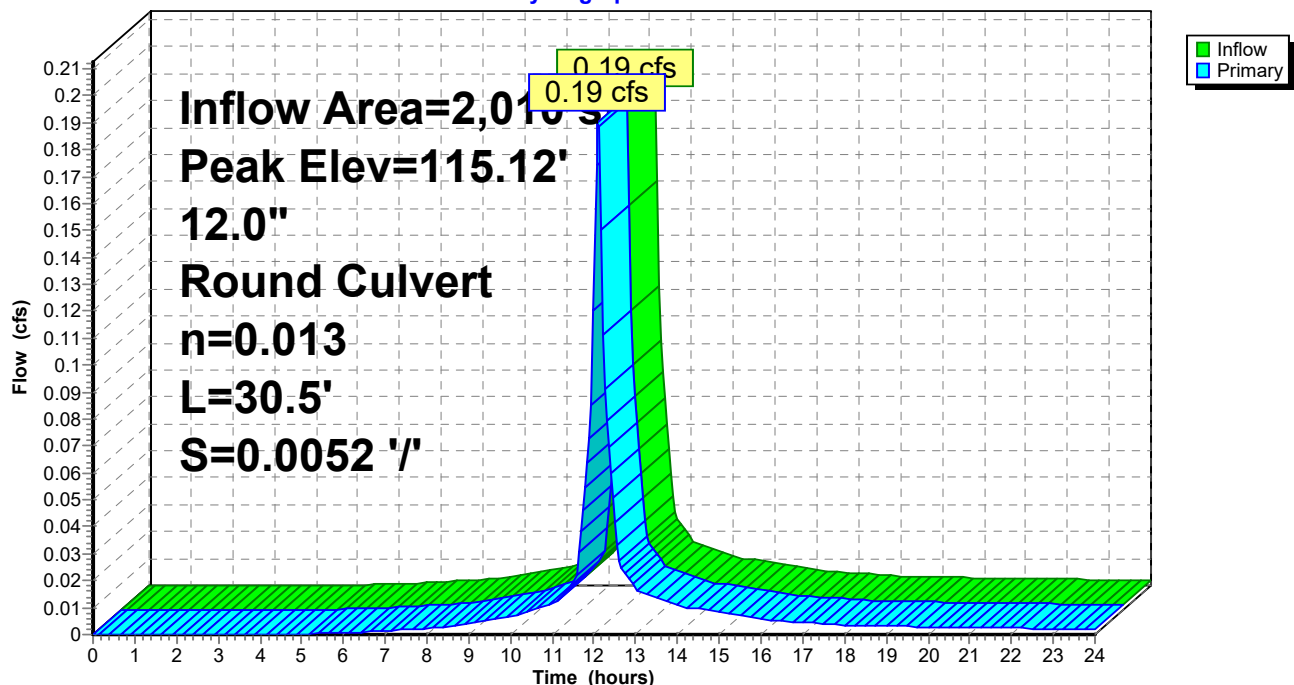
Device	Routing	Invert	Outlet Devices
#1	Primary	114.86'	12.0" Round Culvert L= 30.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.86' / 114.70' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.18 cfs @ 12.09 hrs HW=115.11' (Free Discharge)

↑1=Culvert (Barrel Controls 0.18 cfs @ 1.77 fps)

Pond 3P: CB3

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.83"

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Stage-Area-Storage for Pond 3P: CB3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0	117.42	0
115.32	0	116.38	0	117.44	0
115.34	0	116.40	0	117.46	0
115.36	0	116.42	0	117.48	0
115.38	0	116.44	0	117.50	0
115.40	0	116.46	0	117.52	0
115.42	0	116.48	0	117.54	0
115.44	0	116.50	0	117.56	0
115.46	0	116.52	0	117.58	0
115.48	0	116.54	0	117.60	0
115.50	0	116.56	0	117.62	0
115.52	0	116.58	0	117.64	0
115.54	0	116.60	0	117.66	0
115.56	0	116.62	0	117.68	0
115.58	0	116.64	0	117.70	0
115.60	0	116.66	0	117.72	0
115.62	0	116.68	0	117.74	0
115.64	0	116.70	0	117.76	0
115.66	0	116.72	0	117.78	0
115.68	0	116.74	0	117.80	0
115.70	0	116.76	0	117.82	0
115.72	0	116.78	0	117.84	0
115.74	0	116.80	0	117.86	0
115.76	0	116.82	0	117.88	0
115.78	0	116.84	0	117.90	0
115.80	0	116.86	0	117.92	0
115.82	0	116.88	0	117.94	0
115.84	0	116.90	0	117.96	0
115.86	0	116.92	0	117.98	0
115.88	0	116.94	0	118.00	0
115.90	0	116.96	0		

POST

Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Pond 4P: SUBSURFACE INFILTRATION #1

[81] Warning: Exceeded Pond 10P by 0.74' @ 12.70 hrs

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
 Inflow = 0.21 cfs @ 12.09 hrs, Volume= 753 cf
 Outflow = 0.03 cfs @ 12.63 hrs, Volume= 752 cf, Atten= 87%, Lag= 32.9 min
 Primary = 0.03 cfs @ 12.63 hrs, Volume= 752 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 119.63' @ 12.63 hrs Surf.Area= 281 sf Storage= 250 cf

Plug-Flow detention time= 69.1 min calculated for 752 cf (100% of inflow)
 Center-of-Mass det. time= 68.7 min (816.8 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	118.20'	277 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 292 cf Embedded = 693 cf x 40.0% Voids
#2A	118.70'	292 cf	ADS_StormTech SC-740 b +Cap x 6 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		569 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 116.16'

Primary OutFlow Max=0.03 cfs @ 12.63 hrs HW=119.63' (Free Discharge)↑ **1=Exfiltration** (Controls 0.03 cfs)

POST

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Type III 24-hr 10-Year Rainfall=4.83"

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Pond 4P: SUBSURFACE INFILTRATION #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +12.0" End Stone x 2 = 17.86' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

6 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 291.6 cf Chamber Storage

984.3 cf Field - 291.6 cf Chambers = 692.8 cf Stone x 40.0% Voids = 277.1 cf Stone Storage

Chamber Storage + Stone Storage = 568.7 cf = 0.013 af

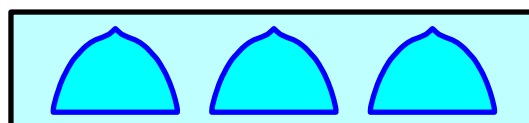
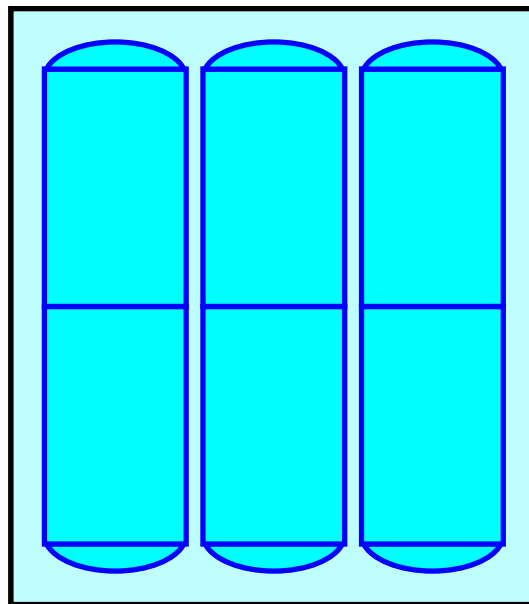
Overall Storage Efficiency = 57.8%

Overall System Size = 17.86' x 15.75' x 3.50'

6 Chambers

36.5 cy Field

25.7 cy Stone



POST

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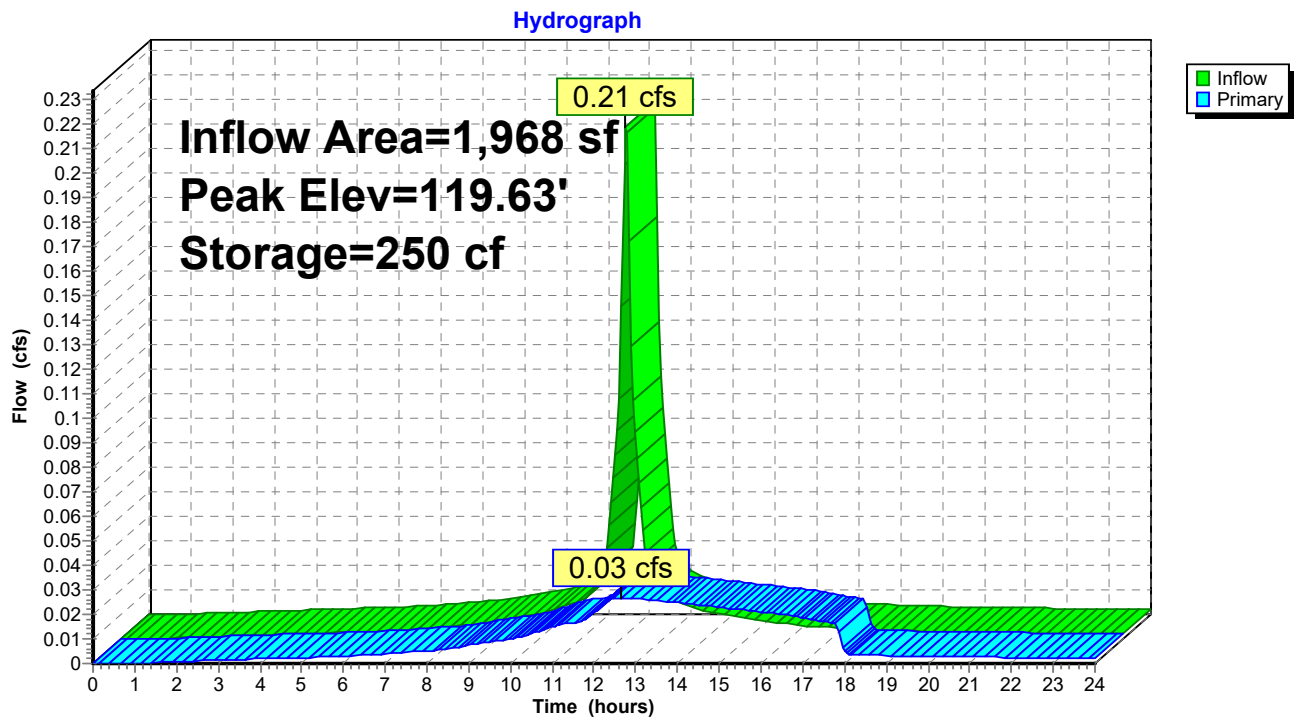
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Pond 4P: SUBSURFACE INFILTRATION #1



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Stage-Area-Storage for Pond 4P: SUBSURFACE INFILTRATION #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
118.20	281	0	120.85	281	468
118.25	281	6	120.90	281	475
118.30	281	11	120.95	281	482
118.35	281	17	121.00	281	489
118.40	281	22	121.05	281	495
118.45	281	28	121.10	281	501
118.50	281	34	121.15	281	507
118.55	281	39	121.20	281	512
118.60	281	45	121.25	281	518
118.65	281	51	121.30	281	524
118.70	281	56	121.35	281	529
118.75	281	67	121.40	281	535
118.80	281	78	121.45	281	541
118.85	281	88	121.50	281	546
118.90	281	99	121.55	281	552
118.95	281	109	121.60	281	557
119.00	281	120	121.65	281	563
119.05	281	131	121.70	281	569
119.10	281	141			
119.15	281	151			
119.20	281	162			
119.25	281	172			
119.30	281	183			
119.35	281	193			
119.40	281	203			
119.45	281	213			
119.50	281	223			
119.55	281	234			
119.60	281	244			
119.65	281	254			
119.70	281	264			
119.75	281	273			
119.80	281	283			
119.85	281	293			
119.90	281	303			
119.95	281	312			
120.00	281	322			
120.05	281	331			
120.10	281	341			
120.15	281	350			
120.20	281	359			
120.25	281	368			
120.30	281	377			
120.35	281	386			
120.40	281	395			
120.45	281	404			
120.50	281	412			
120.55	281	421			
120.60	281	429			
120.65	281	437			
120.70	281	445			
120.75	281	453			
120.80	281	461			

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Summary for Pond 5P: CB4

Inflow Area = 5,921 sf, 77.35% Impervious, Inflow Depth > 3.21" for 10-Year event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 1,583 cf
Outflow = 0.50 cfs @ 12.09 hrs, Volume= 1,583 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 12.09 hrs, Volume= 1,583 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.22' @ 12.09 hrs

Flood Elev= 117.40'

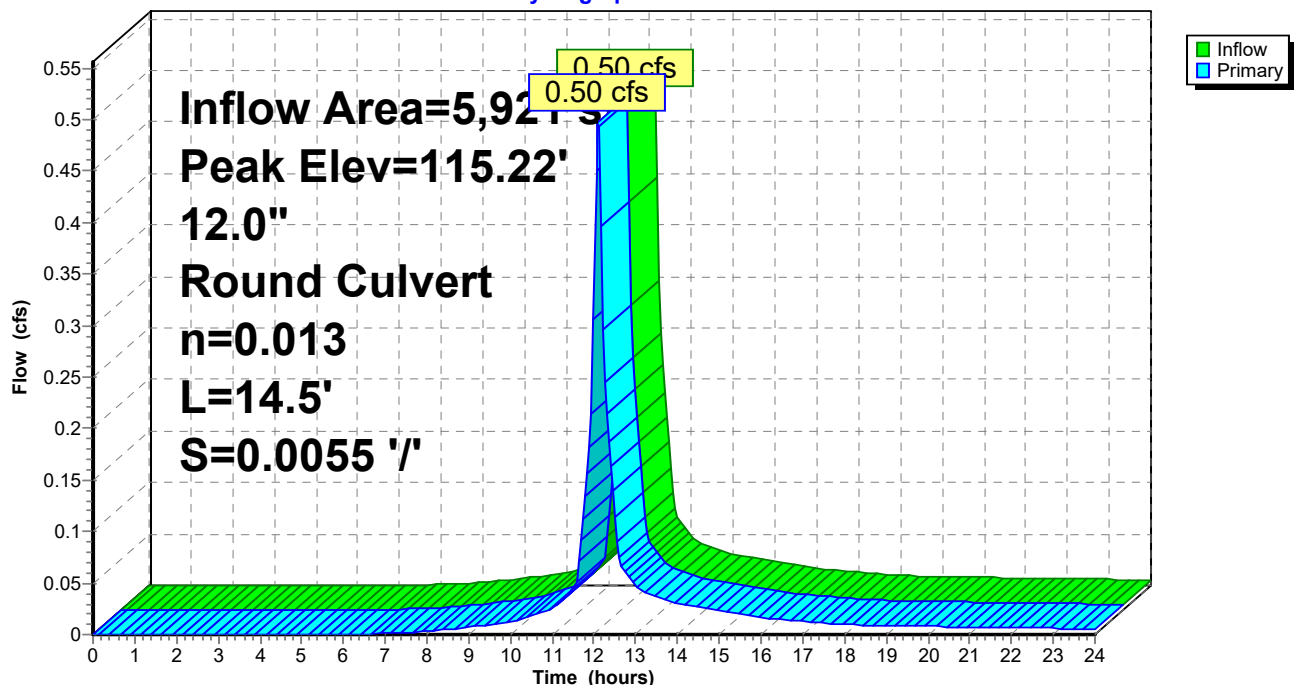
Device	Routing	Invert	Outlet Devices
#1	Primary	114.78'	12.0" Round Culvert L= 14.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.78' / 114.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.49 cfs @ 12.09 hrs HW=115.22' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.49 cfs @ 2.17 fps)

Pond 5P: CB4

Hydrograph



POST

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Stage-Area-Storage for Pond 5P: CB4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.78	0	115.84	0	116.90	0
114.80	0	115.86	0	116.92	0
114.82	0	115.88	0	116.94	0
114.84	0	115.90	0	116.96	0
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0		
115.32	0	116.38	0		
115.34	0	116.40	0		
115.36	0	116.42	0		
115.38	0	116.44	0		
115.40	0	116.46	0		
115.42	0	116.48	0		
115.44	0	116.50	0		
115.46	0	116.52	0		
115.48	0	116.54	0		
115.50	0	116.56	0		
115.52	0	116.58	0		
115.54	0	116.60	0		
115.56	0	116.62	0		
115.58	0	116.64	0		
115.60	0	116.66	0		
115.62	0	116.68	0		
115.64	0	116.70	0		
115.66	0	116.72	0		
115.68	0	116.74	0		
115.70	0	116.76	0		
115.72	0	116.78	0		
115.74	0	116.80	0		
115.76	0	116.82	0		
115.78	0	116.84	0		
115.80	0	116.86	0		
115.82	0	116.88	0		

POST

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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Pond 6P: CDS2

[81] Warning: Exceeded Pond 3P by 0.07' @ 12.10 hrs

[79] Warning: Submerged Pond 5P Primary device # 1 INLET by 0.40'

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 3.34" for 10-Year event
Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,205 cf
Outflow = 0.69 cfs @ 12.09 hrs, Volume= 2,205 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.69 cfs @ 12.09 hrs, Volume= 2,205 cf
Routed to Pond 2P : SUBSURFACE INFILTRATION #2

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 115.19' @ 12.09 hrs
Flood Elev= 118.00'

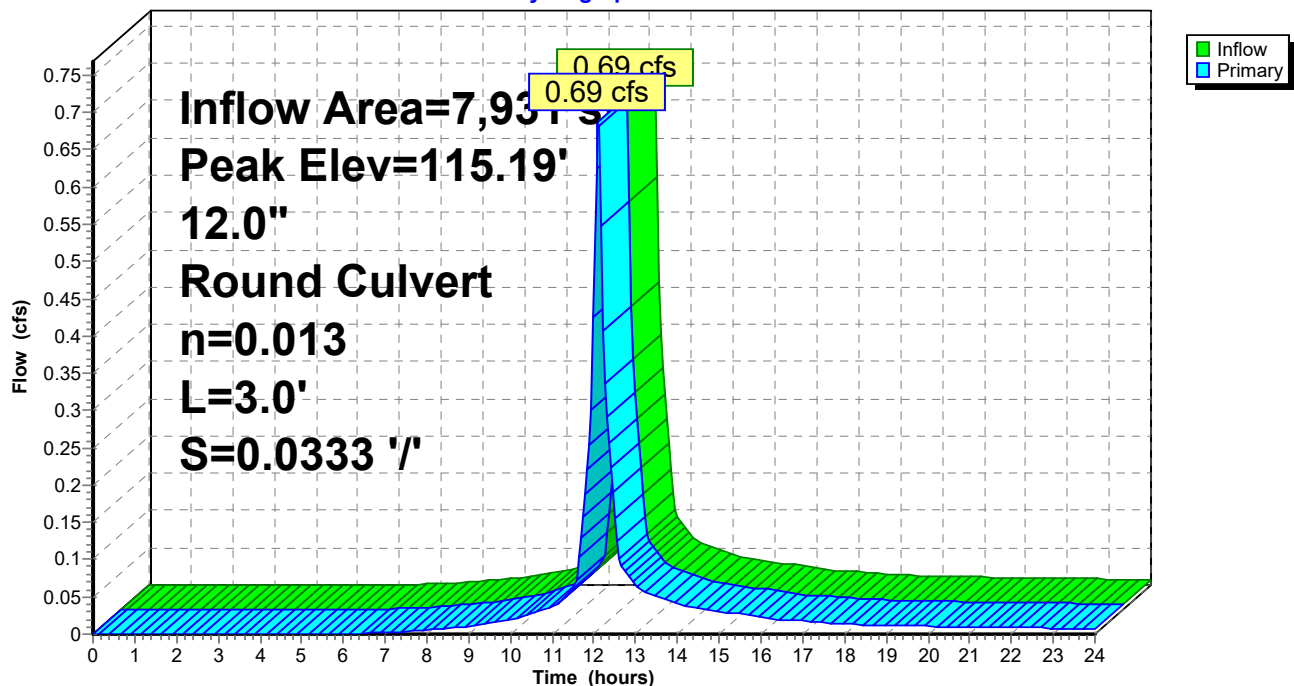
Device	Routing	Invert	Outlet Devices
#1	Primary	114.70'	12.0" Round Culvert L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.70' / 114.60' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.67 cfs @ 12.09 hrs HW=115.18' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.67 cfs @ 2.64 fps)

Pond 6P: CDS2

Hydrograph



POST

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Stage-Area-Storage for Pond 6P: CDS2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.70	0	117.35	0
114.75	0	117.40	0
114.80	0	117.45	0
114.85	0	117.50	0
114.90	0	117.55	0
114.95	0	117.60	0
115.00	0	117.65	0
115.05	0	117.70	0
115.10	0	117.75	0
115.15	0	117.80	0
115.20	0	117.85	0
115.25	0	117.90	0
115.30	0	117.95	0
115.35	0	118.00	0
115.40	0		
115.45	0		
115.50	0		
115.55	0		
115.60	0		
115.65	0		
115.70	0		
115.75	0		
115.80	0		
115.85	0		
115.90	0		
115.95	0		
116.00	0		
116.05	0		
116.10	0		
116.15	0		
116.20	0		
116.25	0		
116.30	0		
116.35	0		
116.40	0		
116.45	0		
116.50	0		
116.55	0		
116.60	0		
116.65	0		
116.70	0		
116.75	0		
116.80	0		
116.85	0		
116.90	0		
116.95	0		
117.00	0		
117.05	0		
117.10	0		
117.15	0		
117.20	0		
117.25	0		
117.30	0		

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Summary for Pond 7P: CB2

Inflow Area = 1,227 sf, 100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 469 cf
Outflow = 0.13 cfs @ 12.09 hrs, Volume= 469 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.09 hrs, Volume= 469 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.37' @ 12.09 hrs

Flood Elev= 122.15'

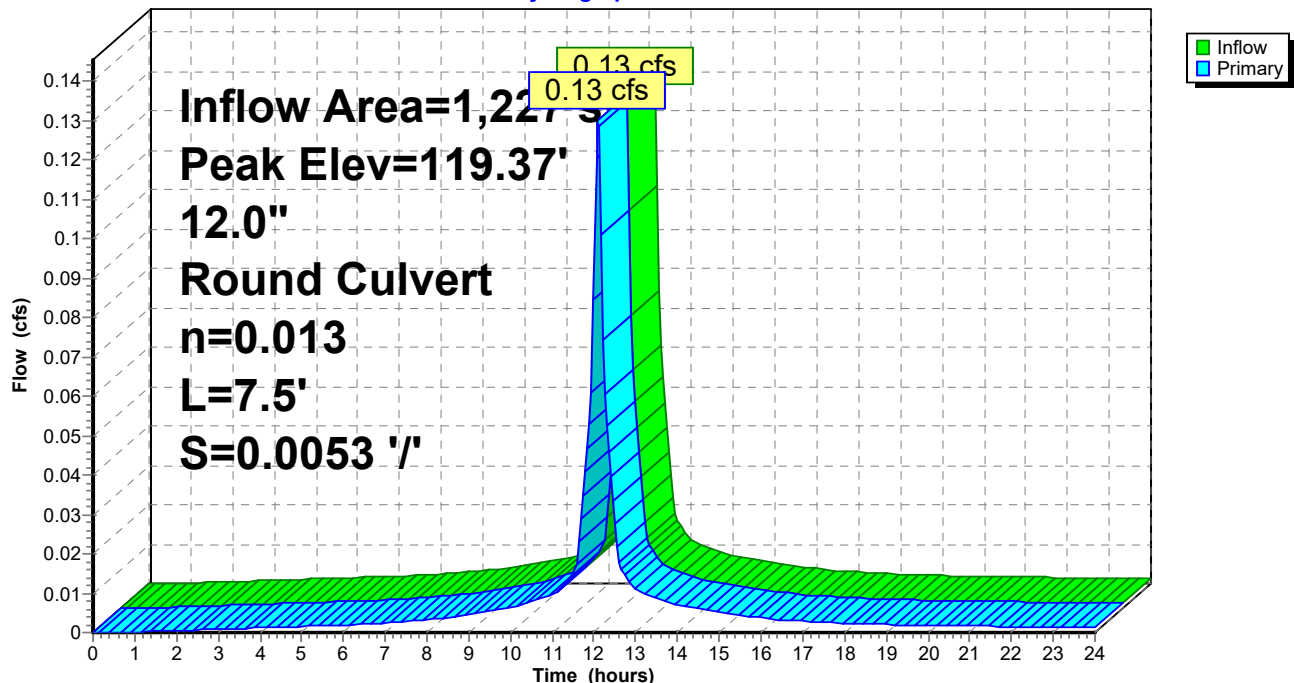
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.09 hrs HW=119.37' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.13 cfs @ 1.50 fps)

Pond 7P: CB2

Hydrograph



POST

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Stage-Area-Storage for Pond 7P: CB2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

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Summary for Pond 8P: DMH1

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.13'

[79] Warning: Submerged Pond 7P Primary device # 1 INLET by 0.13'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.21 cfs @ 12.09 hrs, Volume= 753 cf
Outflow = 0.21 cfs @ 12.09 hrs, Volume= 753 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.09 hrs, Volume= 753 cf
Routed to Pond 10P : CDS1

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

Peak Elev= 119.29' @ 12.09 hrs

Flood Elev= 122.50'

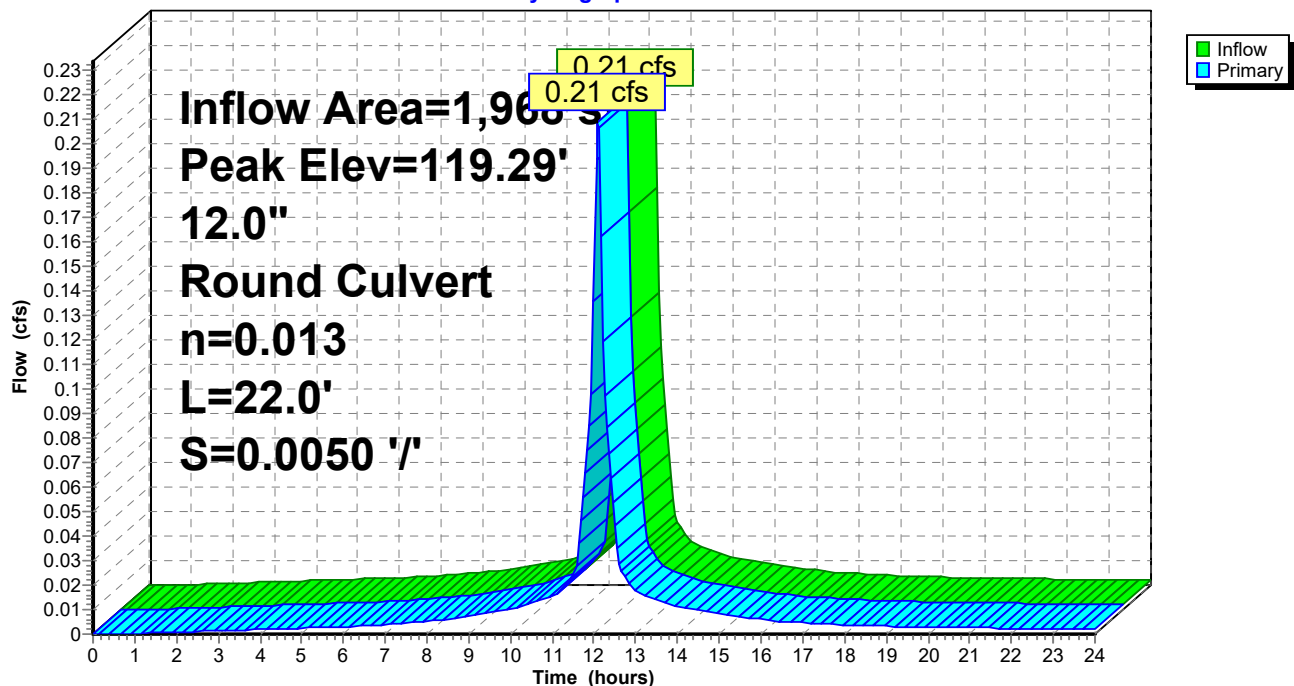
Device	Routing	Invert	Outlet Devices
#1	Primary	119.01'	12.0" Round Culvert L= 22.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.01' / 118.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.09 hrs HW=119.28' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.20 cfs @ 1.76 fps)

Pond 8P: DMH1

Hydrograph



POST

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Stage-Area-Storage for Pond 8P: DMH1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.01	0	121.66	0
119.06	0	121.71	0
119.11	0	121.76	0
119.16	0	121.81	0
119.21	0	121.86	0
119.26	0	121.91	0
119.31	0	121.96	0
119.36	0	122.01	0
119.41	0	122.06	0
119.46	0	122.11	0
119.51	0	122.16	0
119.56	0	122.21	0
119.61	0	122.26	0
119.66	0	122.31	0
119.71	0	122.36	0
119.76	0	122.41	0
119.81	0	122.46	0
119.86	0		
119.91	0		
119.96	0		
120.01	0		
120.06	0		
120.11	0		
120.16	0		
120.21	0		
120.26	0		
120.31	0		
120.36	0		
120.41	0		
120.46	0		
120.51	0		
120.56	0		
120.61	0		
120.66	0		
120.71	0		
120.76	0		
120.81	0		
120.86	0		
120.91	0		
120.96	0		
121.01	0		
121.06	0		
121.11	0		
121.16	0		
121.21	0		
121.26	0		
121.31	0		
121.36	0		
121.41	0		
121.46	0		
121.51	0		
121.56	0		
121.61	0		

POST

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Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Pond 9P: SUBSURFACE INFILTRATION #3

Inflow Area = 3,048 sf, 100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
 Inflow = 0.32 cfs @ 12.09 hrs, Volume= 1,166 cf
 Outflow = 0.04 cfs @ 12.60 hrs, Volume= 1,165 cf, Atten= 86%, Lag= 31.1 min
 Discarded = 0.04 cfs @ 12.60 hrs, Volume= 1,165 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 115.68' @ 12.60 hrs Surf.Area= 506 sf Storage= 368 cf

Plug-Flow detention time= 57.5 min calculated for 1,163 cf (100% of inflow)
 Center-of-Mass det. time= 57.0 min (805.2 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.50'	481 cf	15.75'W x 32.10'L x 3.50'H Field A 1,769 cf Overall - 567 cf Embedded = 1,202 cf x 40.0% Voids
#2A	115.00'	567 cf	ADS_StormTech SC-740 b +Cap x 12 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		1,048 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.50'

Discarded OutFlow Max=0.04 cfs @ 12.60 hrs HW=115.68' (Free Discharge)↑**1=Exfiltration** (Controls 0.04 cfs)

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Pond 9P: SUBSURFACE INFILTRATION #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

12 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 567.2 cf Chamber Storage

1,769.3 cf Field - 567.2 cf Chambers = 1,202.1 cf Stone x 40.0% Voids = 480.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,048.1 cf = 0.024 af

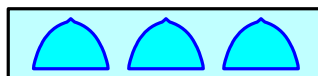
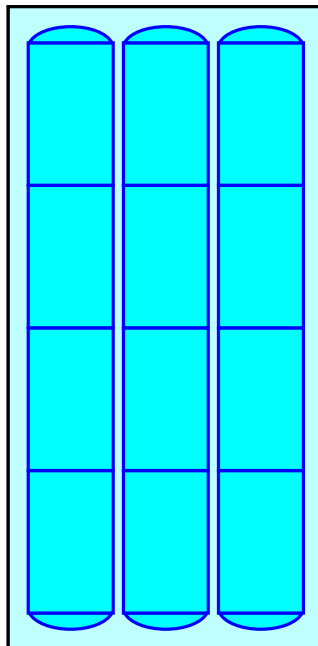
Overall Storage Efficiency = 59.2%

Overall System Size = 32.10' x 15.75' x 3.50'

12 Chambers

65.5 cy Field

44.5 cy Stone



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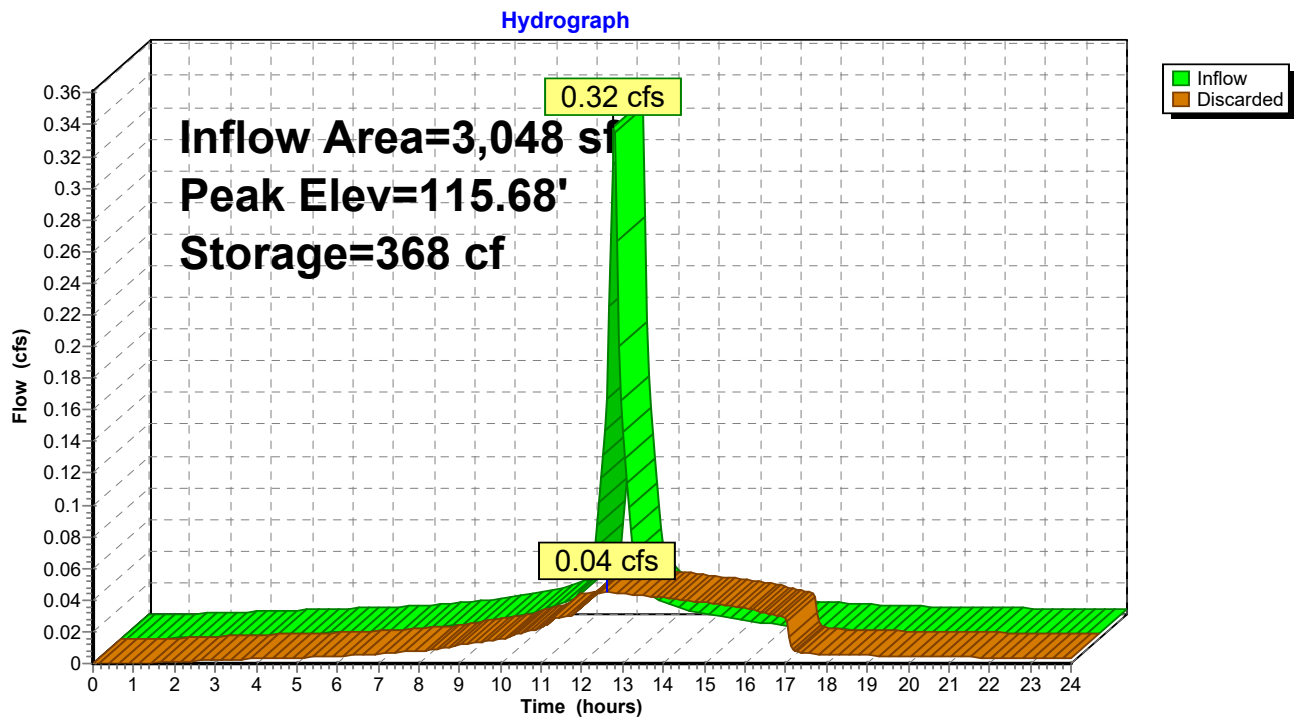
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Pond 9P: SUBSURFACE INFILTRATION #3



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Stage-Area-Storage for Pond 9P: SUBSURFACE INFILTRATION #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.50	506	0	117.15	506	867
114.55	506	10	117.20	506	880
114.60	506	20	117.25	506	892
114.65	506	30	117.30	506	904
114.70	506	40	117.35	506	915
114.75	506	51	117.40	506	926
114.80	506	61	117.45	506	937
114.85	506	71	117.50	506	947
114.90	506	81	117.55	506	957
114.95	506	91	117.60	506	967
115.00	506	101	117.65	506	977
115.05	506	121	117.70	506	987
115.10	506	141	117.75	506	998
115.15	506	161	117.80	506	1,008
115.20	506	181	117.85	506	1,018
115.25	506	200	117.90	506	1,028
115.30	506	220	117.95	506	1,038
115.35	506	240	118.00	506	1,048
115.40	506	259			
115.45	506	279			
115.50	506	298			
115.55	506	318			
115.60	506	337			
115.65	506	356			
115.70	506	375			
115.75	506	394			
115.80	506	413			
115.85	506	432			
115.90	506	451			
115.95	506	469			
116.00	506	488			
116.05	506	506			
116.10	506	524			
116.15	506	543			
116.20	506	561			
116.25	506	578			
116.30	506	596			
116.35	506	614			
116.40	506	631			
116.45	506	648			
116.50	506	665			
116.55	506	682			
116.60	506	699			
116.65	506	716			
116.70	506	732			
116.75	506	748			
116.80	506	764			
116.85	506	779			
116.90	506	795			
116.95	506	810			
117.00	506	825			
117.05	506	839			
117.10	506	853			

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Summary for Pond 10P: CDS1

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.05'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.21 cfs @ 12.09 hrs, Volume= 753 cf
Outflow = 0.21 cfs @ 12.09 hrs, Volume= 753 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.09 hrs, Volume= 753 cf
Routed to Pond 4P : SUBSURFACE INFILTRATION #1

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

Peak Elev= 119.06' @ 12.09 hrs

Flood Elev= 122.50'

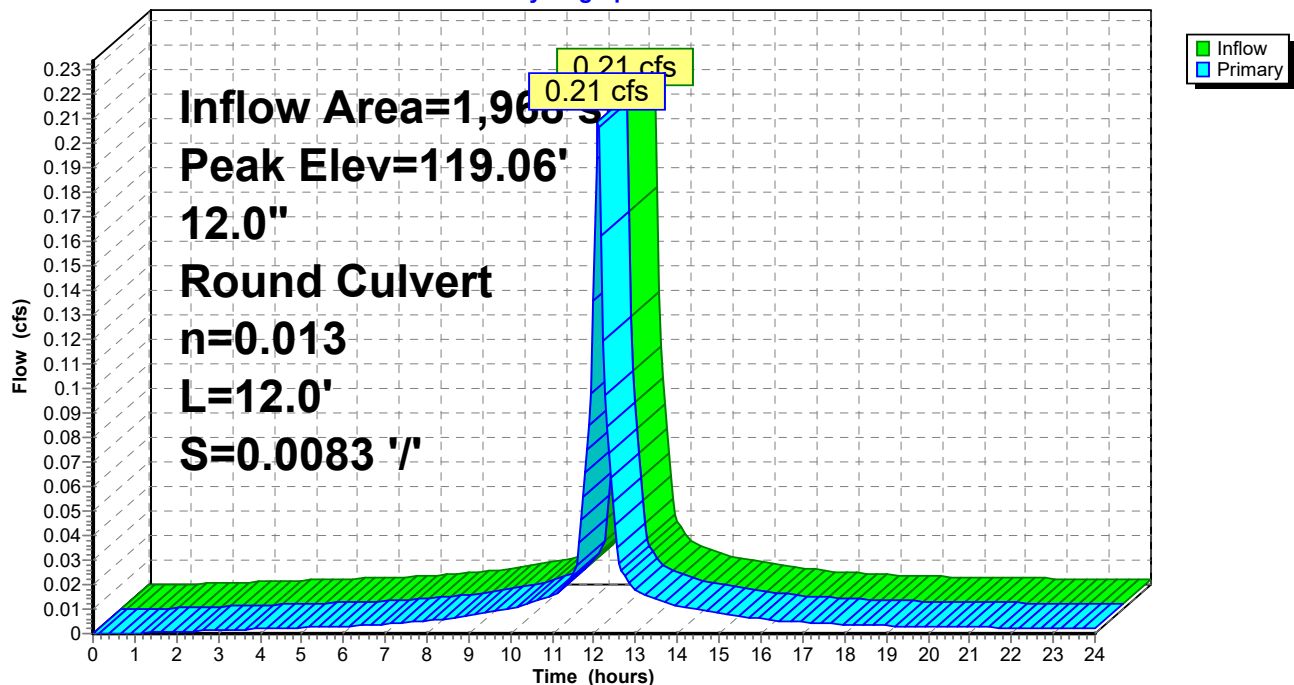
Device	Routing	Invert	Outlet Devices
#1	Primary	118.80'	12.0" Round Culvert L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.80' / 118.70' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.09 hrs HW=119.06' (Free Discharge)

1=Culvert (Barrel Controls 0.20 cfs @ 1.90 fps)

Pond 10P: CDS1

Hydrograph



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Stage-Area-Storage for Pond 10P: CDS1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
118.80	0	121.45	0
118.85	0	121.50	0
118.90	0	121.55	0
118.95	0	121.60	0
119.00	0	121.65	0
119.05	0	121.70	0
119.10	0	121.75	0
119.15	0	121.80	0
119.20	0	121.85	0
119.25	0	121.90	0
119.30	0	121.95	0
119.35	0	122.00	0
119.40	0	122.05	0
119.45	0	122.10	0
119.50	0	122.15	0
119.55	0	122.20	0
119.60	0	122.25	0
119.65	0	122.30	0
119.70	0	122.35	0
119.75	0	122.40	0
119.80	0	122.45	0
119.85	0	122.50	0
119.90	0		
119.95	0		
120.00	0		
120.05	0		
120.10	0		
120.15	0		
120.20	0		
120.25	0		
120.30	0		
120.35	0		
120.40	0		
120.45	0		
120.50	0		
120.55	0		
120.60	0		
120.65	0		
120.70	0		
120.75	0		
120.80	0		
120.85	0		
120.90	0		
120.95	0		
121.00	0		
121.05	0		
121.10	0		
121.15	0		
121.20	0		
121.25	0		
121.30	0		
121.35	0		
121.40	0		

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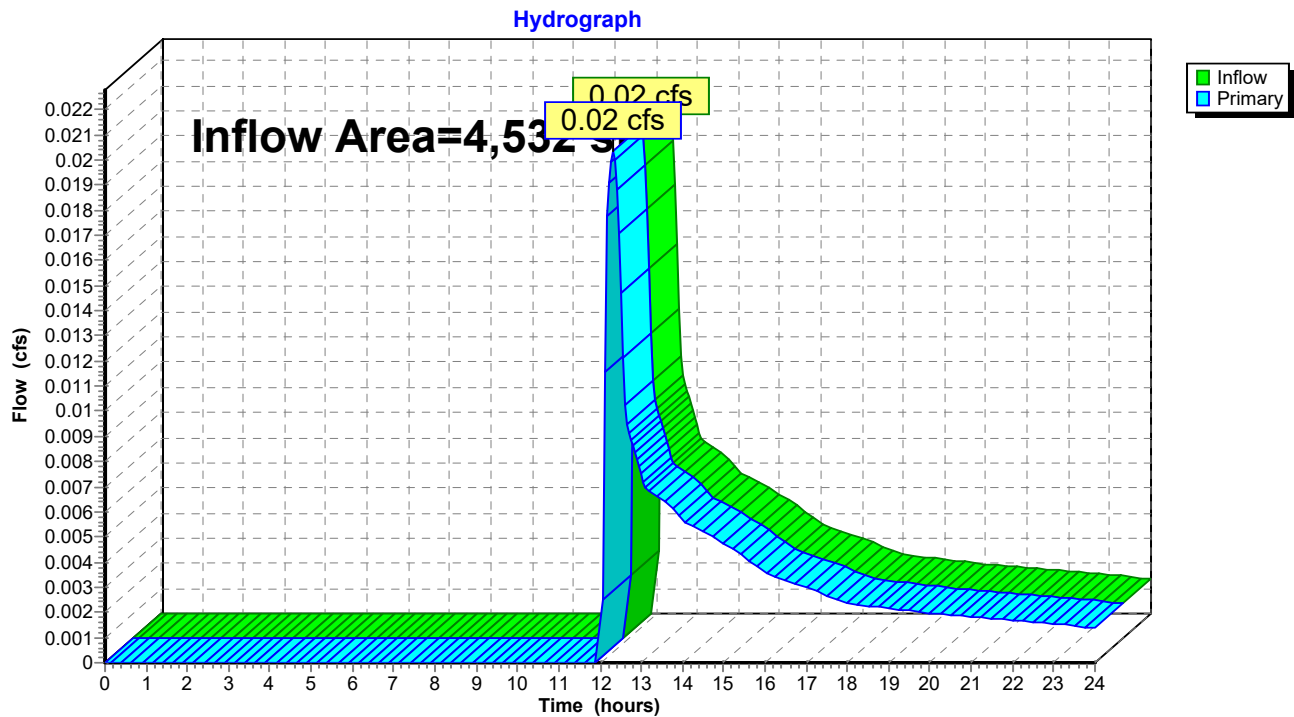
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Summary for Link DP1: link

Inflow Area = 4,532 sf, 12.29% Impervious, Inflow Depth > 0.43" for 10-Year event
Inflow = 0.02 cfs @ 12.30 hrs, Volume= 163 cf
Primary = 0.02 cfs @ 12.30 hrs, Volume= 163 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link



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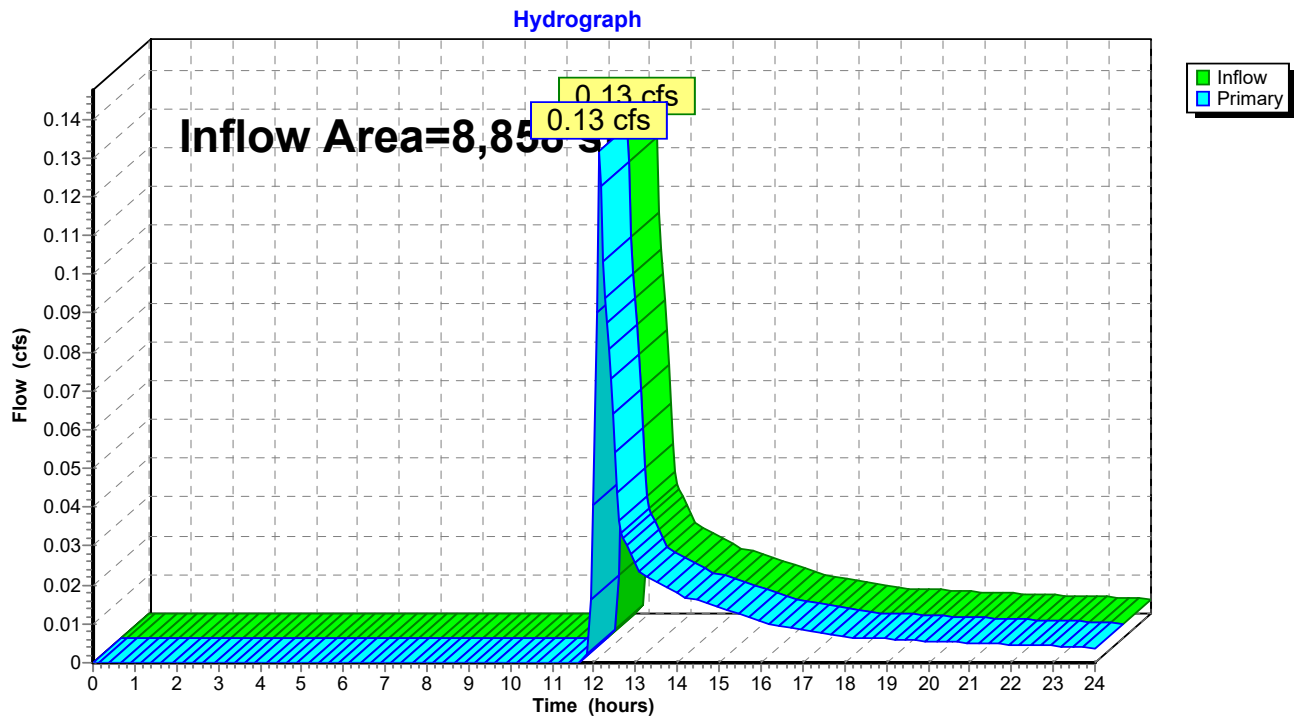
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Summary for Link DP2: link

Inflow Area = 8,858 sf, 24.43% Impervious, Inflow Depth > 0.78" for 10-Year event
Inflow = 0.13 cfs @ 12.12 hrs, Volume= 577 cf
Primary = 0.13 cfs @ 12.12 hrs, Volume= 577 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link



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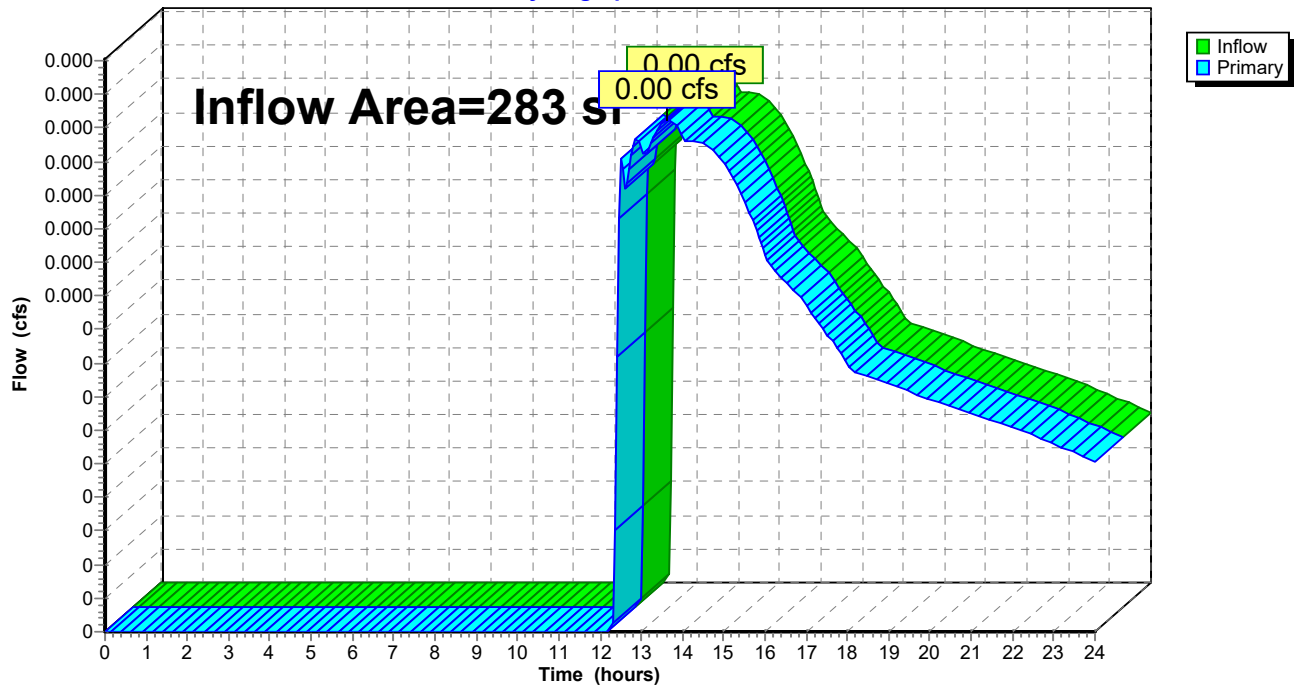
Summary for Link DP3: link

Inflow Area = 283 sf, 0.00% Impervious, Inflow Depth > 0.17" for 10-Year event
Inflow = 0.00 cfs @ 13.65 hrs, Volume= 4 cf
Primary = 0.00 cfs @ 13.65 hrs, Volume= 4 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP3: link

Hydrograph



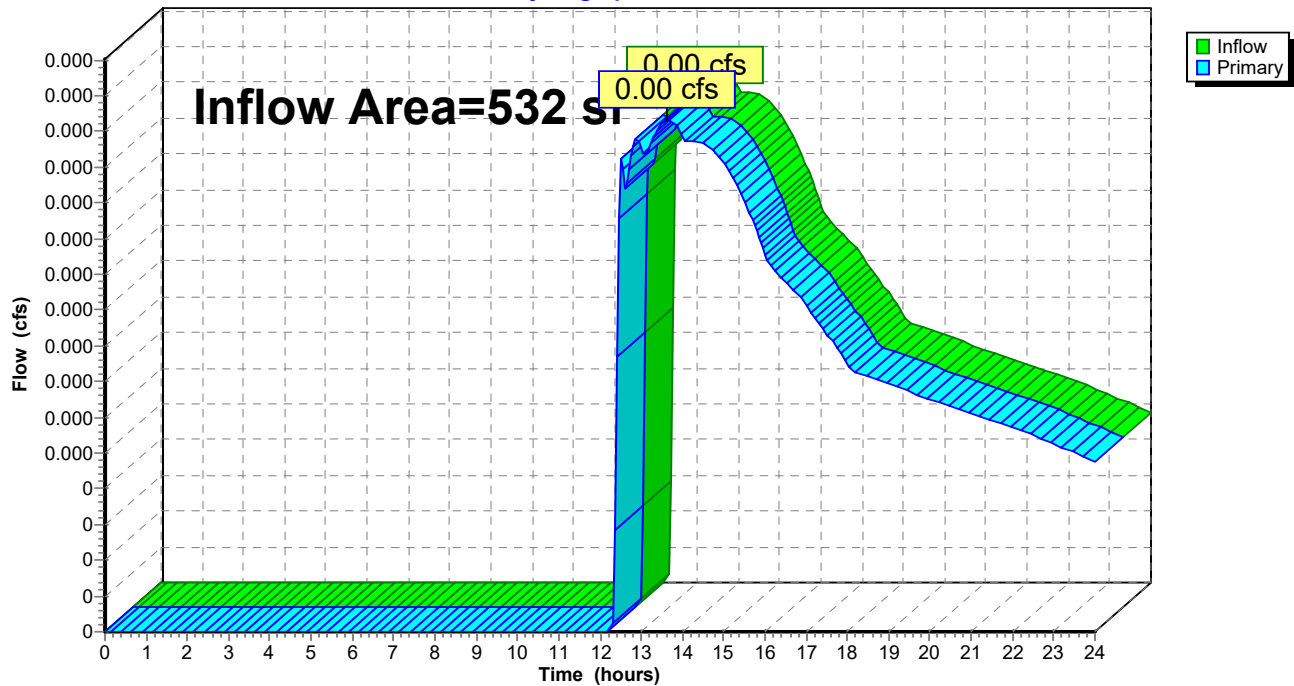
Summary for Link DP4: link

Inflow Area = 532 sf, 0.00% Impervious, Inflow Depth > 0.17" for 10-Year event
 Inflow = 0.00 cfs @ 13.65 hrs, Volume= 7 cf
 Primary = 0.00 cfs @ 13.65 hrs, Volume= 7 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

Hydrograph



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

SubcatchmentP1: P1	Runoff Area=4,532 sf 12.29% Impervious Runoff Depth>0.93" Tc=6.0 min CN=46 Runoff=0.08 cfs 352 cf
SubcatchmentP2: P2	Runoff Area=8,858 sf 24.43% Impervious Runoff Depth>1.45" Tc=6.0 min CN=53 Runoff=0.30 cfs 1,070 cf
SubcatchmentP3: P3	Runoff Area=283 sf 0.00% Impervious Runoff Depth>0.49" Tc=6.0 min CN=39 Runoff=0.00 cfs 12 cf
SubcatchmentP4: P4A	Runoff Area=532 sf 0.00% Impervious Runoff Depth>0.49" Tc=6.0 min CN=39 Runoff=0.00 cfs 22 cf
SubcatchmentP5A: P5A	Runoff Area=1,227 sf 100.00% Impervious Runoff Depth>5.92" Tc=6.0 min CN=98 Runoff=0.17 cfs 605 cf
SubcatchmentP5B: P5B	Runoff Area=741 sf 100.00% Impervious Runoff Depth>5.92" Tc=6.0 min CN=98 Runoff=0.10 cfs 365 cf
SubcatchmentP6A: P6A	Runoff Area=2,010 sf 85.82% Impervious Runoff Depth>5.00" Tc=6.0 min CN=90 Runoff=0.25 cfs 837 cf
SubcatchmentP6B: P6B	Runoff Area=5,921 sf 77.35% Impervious Runoff Depth>4.45" Tc=6.0 min CN=85 Runoff=0.68 cfs 2,196 cf
SubcatchmentP7: P7	Runoff Area=3,048 sf 100.00% Impervious Runoff Depth>5.92" Tc=6.0 min CN=98 Runoff=0.41 cfs 1,503 cf
Pond 1P: CB1	Peak Elev=119.34' Inflow=0.10 cfs 365 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 ' /' Outflow=0.10 cfs 365 cf
Pond 2P: SUBSURFACE INFILTRATION #2	Peak Elev=115.15' Storage=1,023 cf Inflow=0.93 cfs 3,033 cf Outflow=0.13 cfs 3,032 cf
Pond 3P: CB3	Peak Elev=115.16' Inflow=0.25 cfs 837 cf 12.0" Round Culvert n=0.013 L=30.5' S=0.0052 ' /' Outflow=0.25 cfs 837 cf
Pond 4P: SUBSURFACE INFILTRATION #1	Peak Elev=120.12' Storage=345 cf Inflow=0.27 cfs 971 cf Outflow=0.03 cfs 970 cf
Pond 5P: CB4	Peak Elev=115.31' Inflow=0.68 cfs 2,196 cf 12.0" Round Culvert n=0.013 L=14.5' S=0.0055 ' /' Outflow=0.68 cfs 2,196 cf
Pond 6P: CDS2	Peak Elev=115.28' Inflow=0.93 cfs 3,033 cf 12.0" Round Culvert n=0.013 L=3.0' S=0.0333 ' /' Outflow=0.93 cfs 3,033 cf
Pond 7P: CB2	Peak Elev=119.40' Inflow=0.17 cfs 605 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 ' /' Outflow=0.17 cfs 605 cf

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Pond 8P: DMH1

Peak Elev=119.32' Inflow=0.27 cfs 971 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0050 ' /' Outflow=0.27 cfs 971 cf

Pond 9P: SUBSURFACE INFILTRATION #3

Peak Elev=116.06' Storage=510 cf Inflow=0.41 cfs 1,503 cf
Outflow=0.05 cfs 1,502 cf

Pond 10P: CDS1

Peak Elev=119.10' Inflow=0.27 cfs 971 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 ' /' Outflow=0.27 cfs 971 cf

Link DP1: link

Inflow=0.08 cfs 352 cf
Primary=0.08 cfs 352 cf

Link DP2: link

Inflow=0.30 cfs 1,070 cf
Primary=0.30 cfs 1,070 cf

Link DP3: link

Inflow=0.00 cfs 12 cf
Primary=0.00 cfs 12 cf

Link DP4: link

Inflow=0.00 cfs 22 cf
Primary=0.00 cfs 22 cf

Total Runoff Area = 27,152 sf Runoff Volume = 6,963 cf Average Runoff Depth = 3.08"
48.28% Pervious = 13,110 sf 51.72% Impervious = 14,042 sf

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Summary for Subcatchment P1: P1

Runoff = 0.08 cfs @ 12.12 hrs, Volume= 352 cf, Depth> 0.93"
Routed to Link DP1 : link

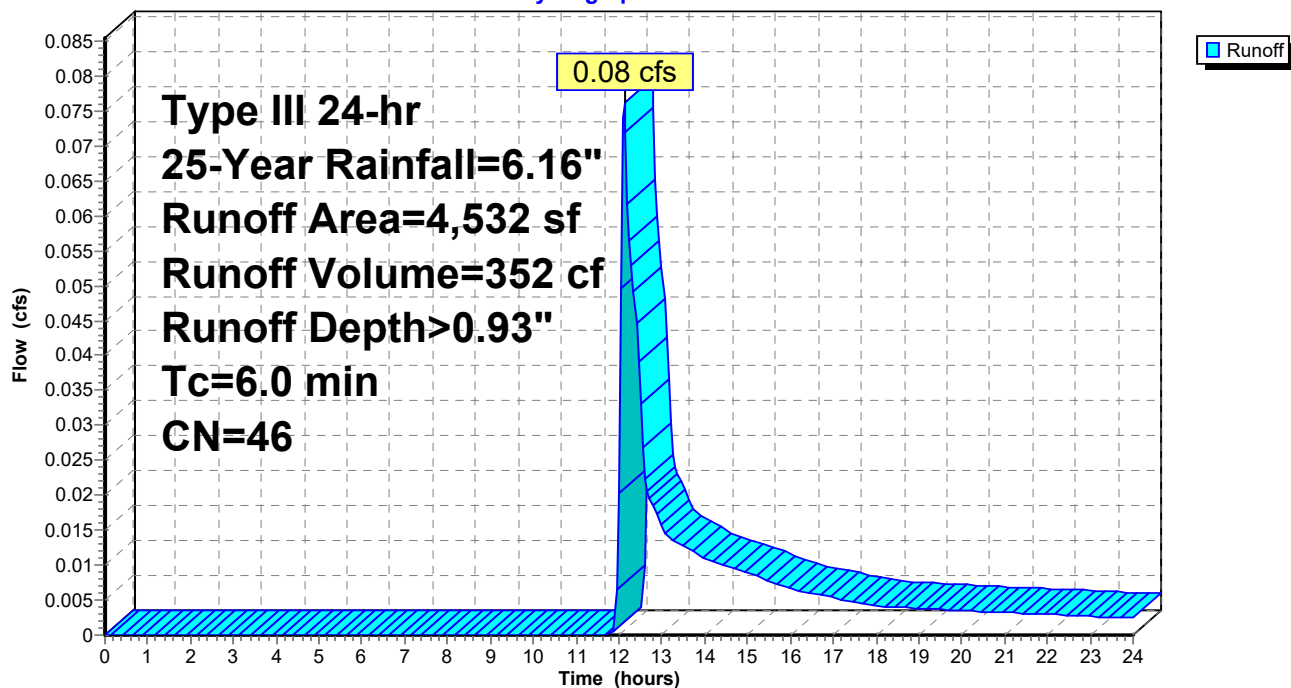
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
557	98	Roofs, HSG A
3,975	39	>75% Grass cover, Good, HSG A
4,532	46	Weighted Average
3,975		87.71% Pervious Area
557		12.29% Impervious Area

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

Subcatchment P1: P1

Hydrograph



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Summary for Subcatchment P2: P2

Runoff = 0.30 cfs @ 12.11 hrs, Volume= 1,070 cf, Depth> 1.45"
Routed to Link DP2 : link

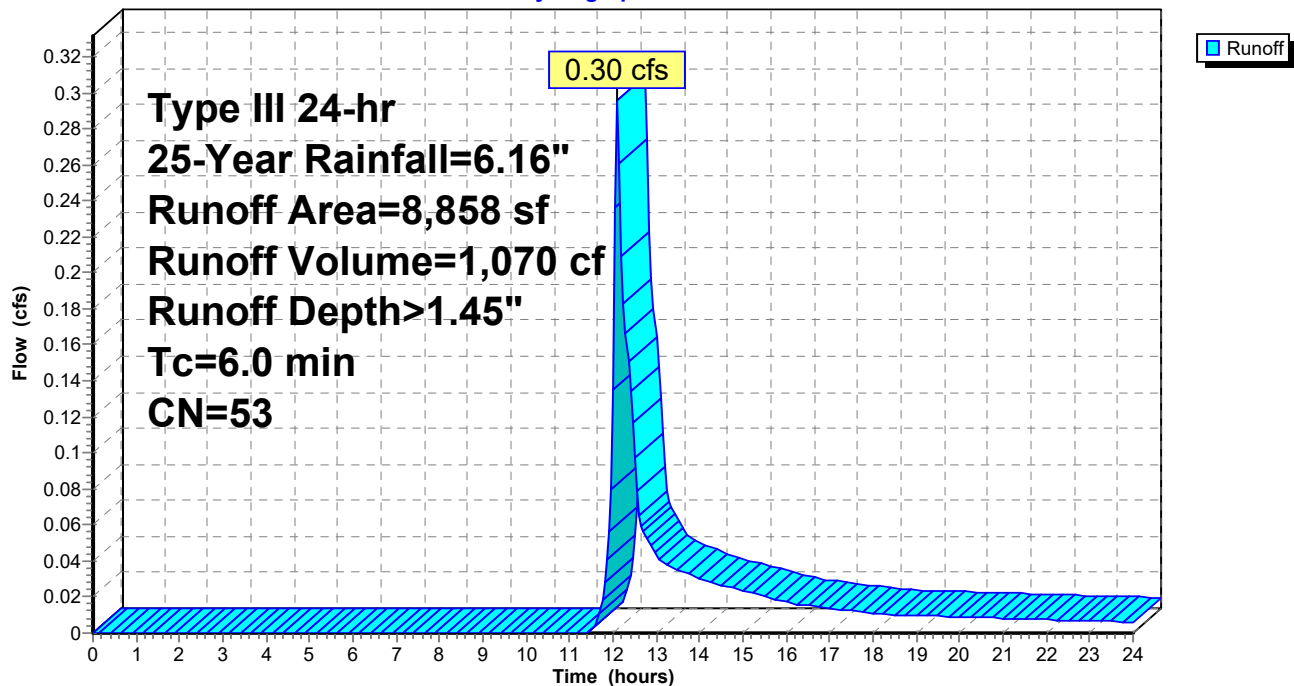
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
2,164	98	Roofs, HSG A
6,694	39	>75% Grass cover, Good, HSG A
8,858	53	Weighted Average
6,694		75.57% Pervious Area
2,164		24.43% Impervious Area

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

Subcatchment P2: P2

Hydrograph



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Summary for Subcatchment P4: P4A

Runoff = 0.00 cfs @ 12.33 hrs, Volume= 22 cf, Depth> 0.49"
Routed to Link DP4 : link

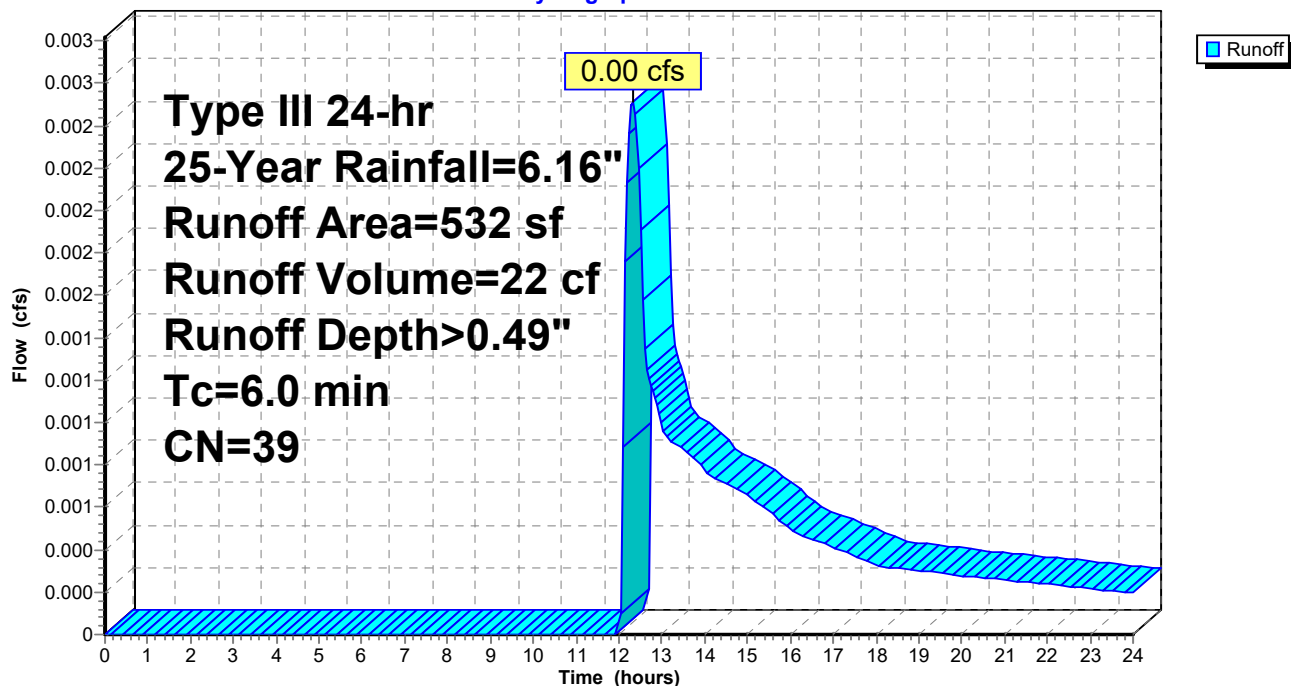
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
532	39	>75% Grass cover, Good, HSG A
532		100.00% Pervious Area

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

Subcatchment P4: P4A

Hydrograph



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Summary for Subcatchment P5A: P5A

Runoff = 0.17 cfs @ 12.09 hrs, Volume= 605 cf, Depth> 5.92"
Routed to Pond 7P : CB2

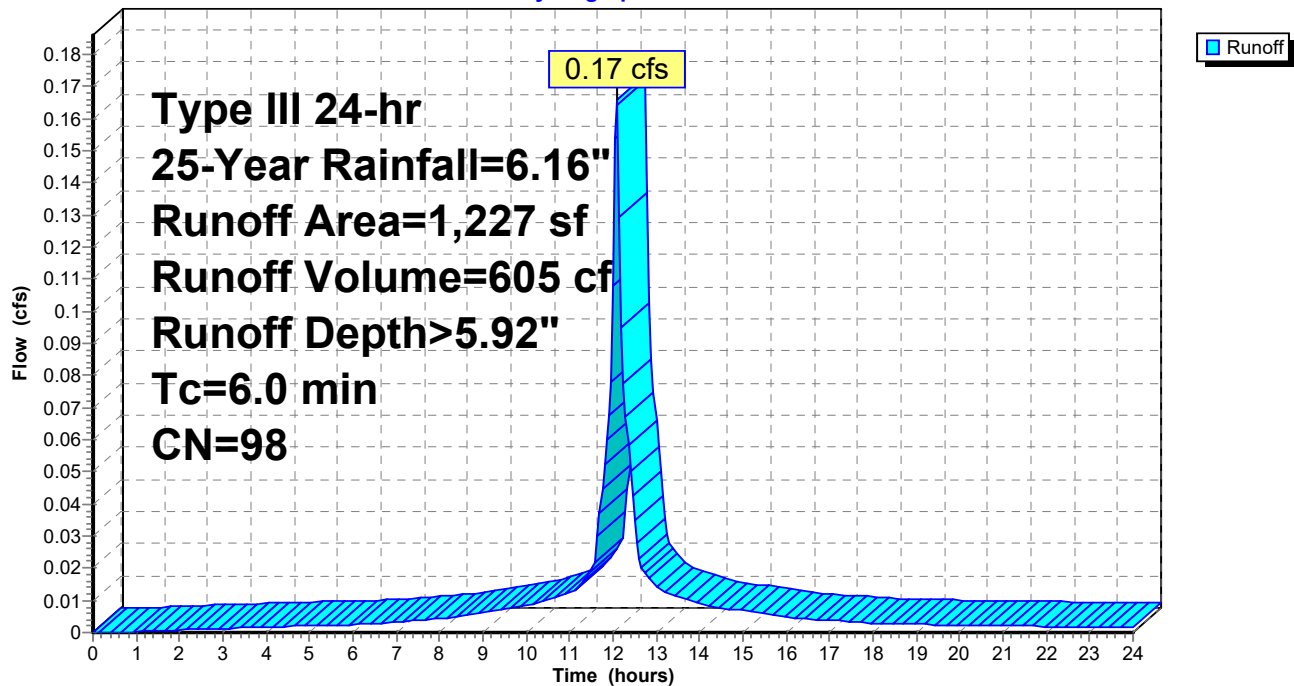
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
1,227	98	Paved parking, HSG A
1,227		100.00% Impervious Area

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

Subcatchment P5A: P5A

Hydrograph



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Summary for Subcatchment P5B: P5B

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 365 cf, Depth> 5.92"
Routed to Pond 1P : CB1

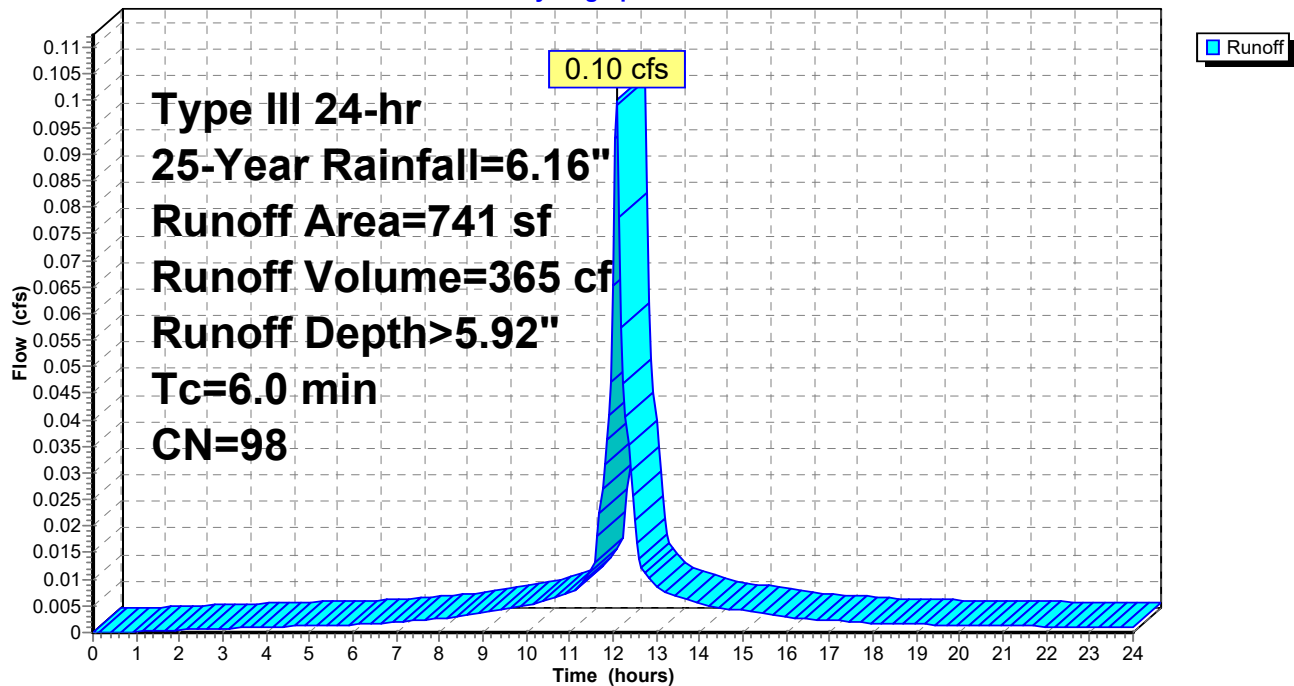
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
741	98	Paved parking, HSG A
741		100.00% Impervious Area

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

Subcatchment P5B: P5B

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Summary for Subcatchment P6A: P6A

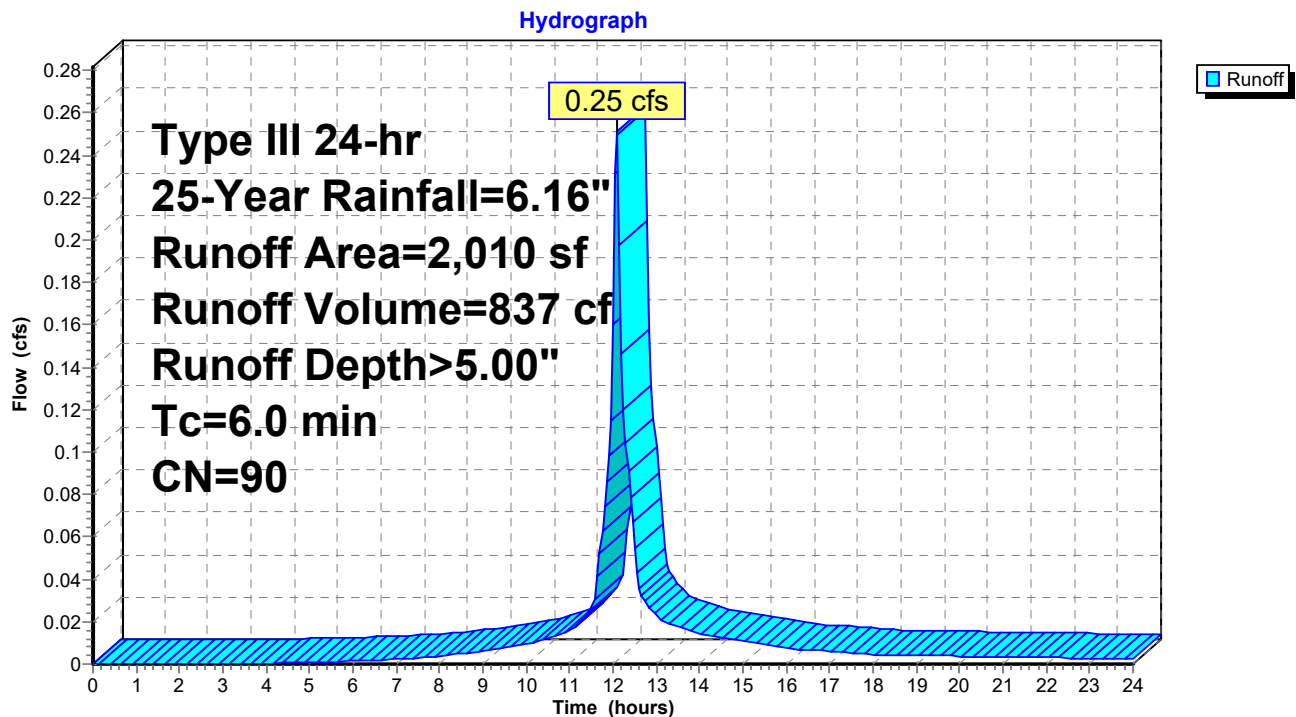
Runoff = 0.25 cfs @ 12.09 hrs, Volume= 837 cf, Depth> 5.00"
Routed to Pond 3P : CB3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
285	39	>75% Grass cover, Good, HSG A
1,725	98	Paved parking, HSG A
2,010	90	Weighted Average
285		14.18% Pervious Area
1,725		85.82% Impervious Area

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

Subcatchment P6A: P6A



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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Subcatchment P6B: P6B

Runoff = 0.68 cfs @ 12.09 hrs, Volume= 2,196 cf, Depth> 4.45"
Routed to Pond 5P : CB4

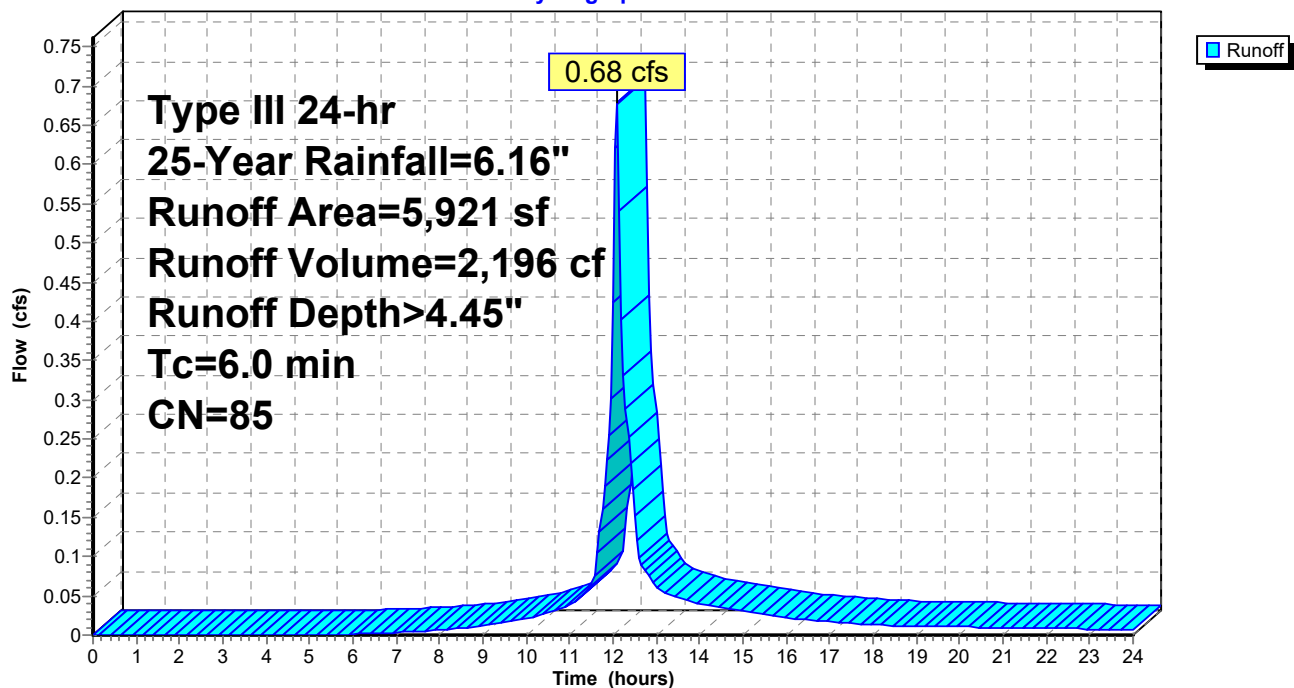
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
1,341	39	>75% Grass cover, Good, HSG A
4,580	98	Paved parking, HSG A
5,921	85	Weighted Average
1,341		22.65% Pervious Area
4,580		77.35% Impervious Area

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

Subcatchment P6B: P6B

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Subcatchment P7: P7

Runoff = 0.41 cfs @ 12.09 hrs, Volume= 1,503 cf, Depth> 5.92"
Routed to Pond 9P : SUBSURFACE INFILTRATION #3

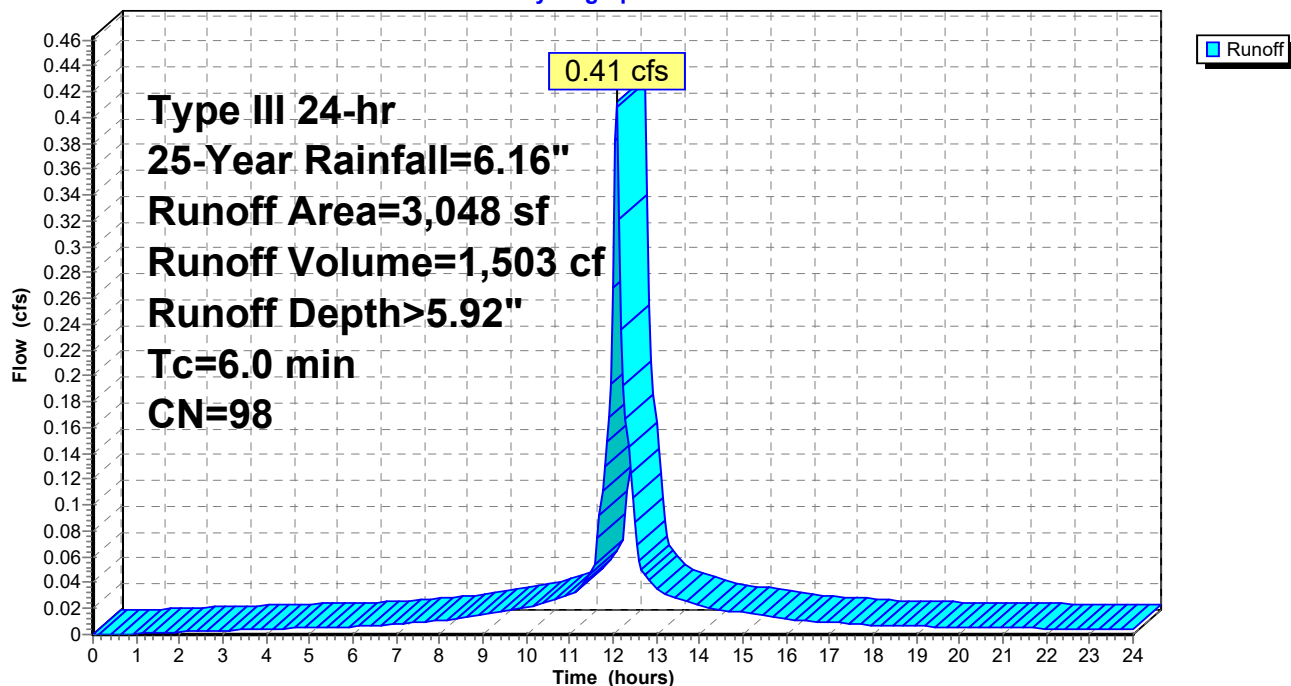
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
3,048	98	Roofs, HSG A
3,048		100.00% Impervious Area

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

Subcatchment P7: P7

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Pond 1P: CB1

Inflow Area = 741 sf, 100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 365 cf
Outflow = 0.10 cfs @ 12.09 hrs, Volume= 365 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 12.09 hrs, Volume= 365 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.34' @ 12.09 hrs

Flood Elev= 122.15'

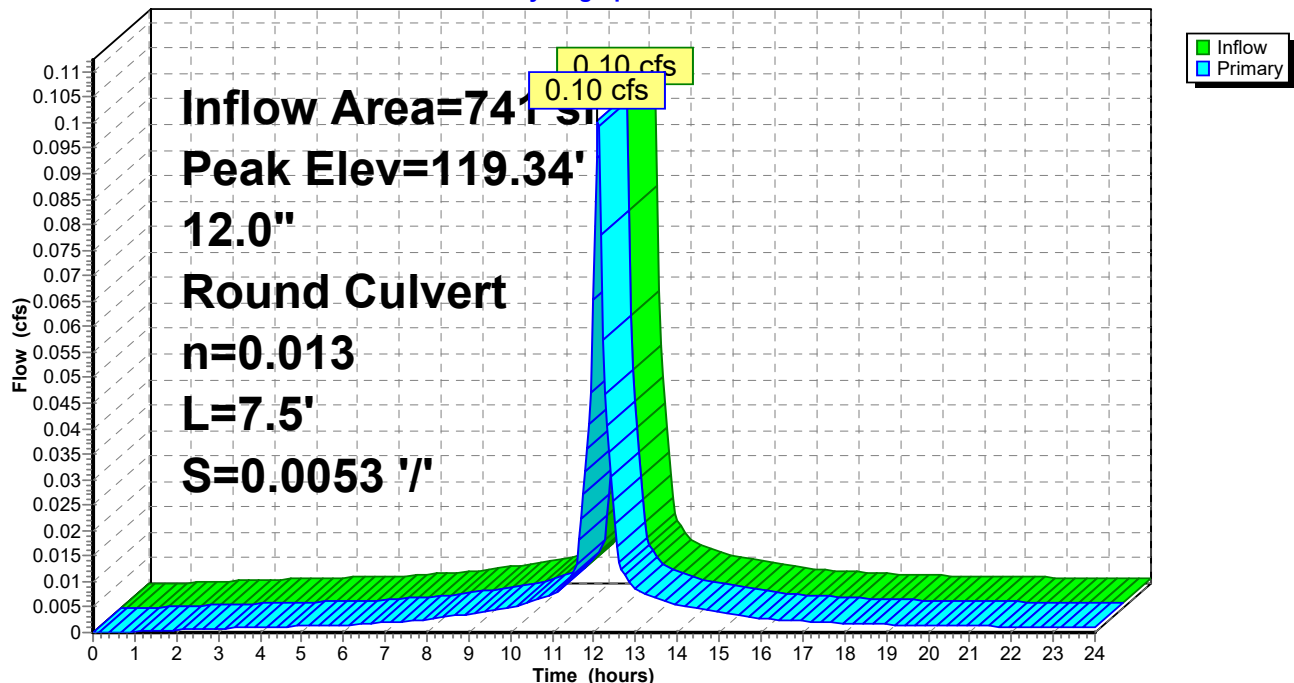
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.10 cfs @ 12.09 hrs HW=119.34' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.10 cfs @ 1.41 fps)

Pond 1P: CB1

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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Stage-Area-Storage for Pond 1P: CB1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

POST

Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Pond 2P: SUBSURFACE INFILTRATION #2

[81] Warning: Exceeded Pond 6P by 0.26' @ 12.75 hrs

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 4.59" for 25-Year event
 Inflow = 0.93 cfs @ 12.09 hrs, Volume= 3,033 cf
 Outflow = 0.13 cfs @ 12.62 hrs, Volume= 3,032 cf, Atten= 86%, Lag= 31.8 min
 Primary = 0.13 cfs @ 12.62 hrs, Volume= 3,032 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 115.15' @ 12.62 hrs Surf.Area= 1,494 sf Storage= 1,023 cf

Plug-Flow detention time= 60.2 min calculated for 3,025 cf (100% of inflow)
 Center-of-Mass det. time= 59.8 min (854.6 - 794.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.00'	1,064 cf	28.17'W x 53.04'L x 2.33'H Field A 3,486 cf Overall - 826 cf Embedded = 2,660 cf x 40.0% Voids
#2A	114.50'	826 cf	ADS_StormTech SC-310 +Cap x 56 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
		1,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	114.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.00'

Primary OutFlow Max=0.13 cfs @ 12.62 hrs HW=115.15' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.13 cfs)

POST

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Type III 24-hr 25-Year Rainfall=6.16"

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Pond 2P: SUBSURFACE INFILTRATION #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

8 Rows x 34.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 28.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

56 Chambers x 14.7 cf = 825.5 cf Chamber Storage

3,485.9 cf Field - 825.5 cf Chambers = 2,660.4 cf Stone x 40.0% Voids = 1,064.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,889.7 cf = 0.043 af

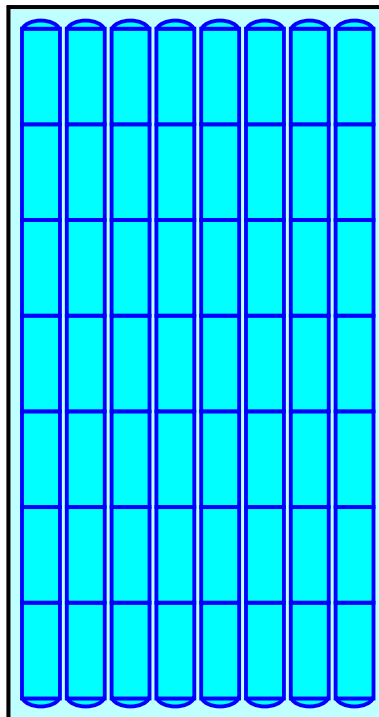
Overall Storage Efficiency = 54.2%

Overall System Size = 53.04' x 28.17' x 2.33'

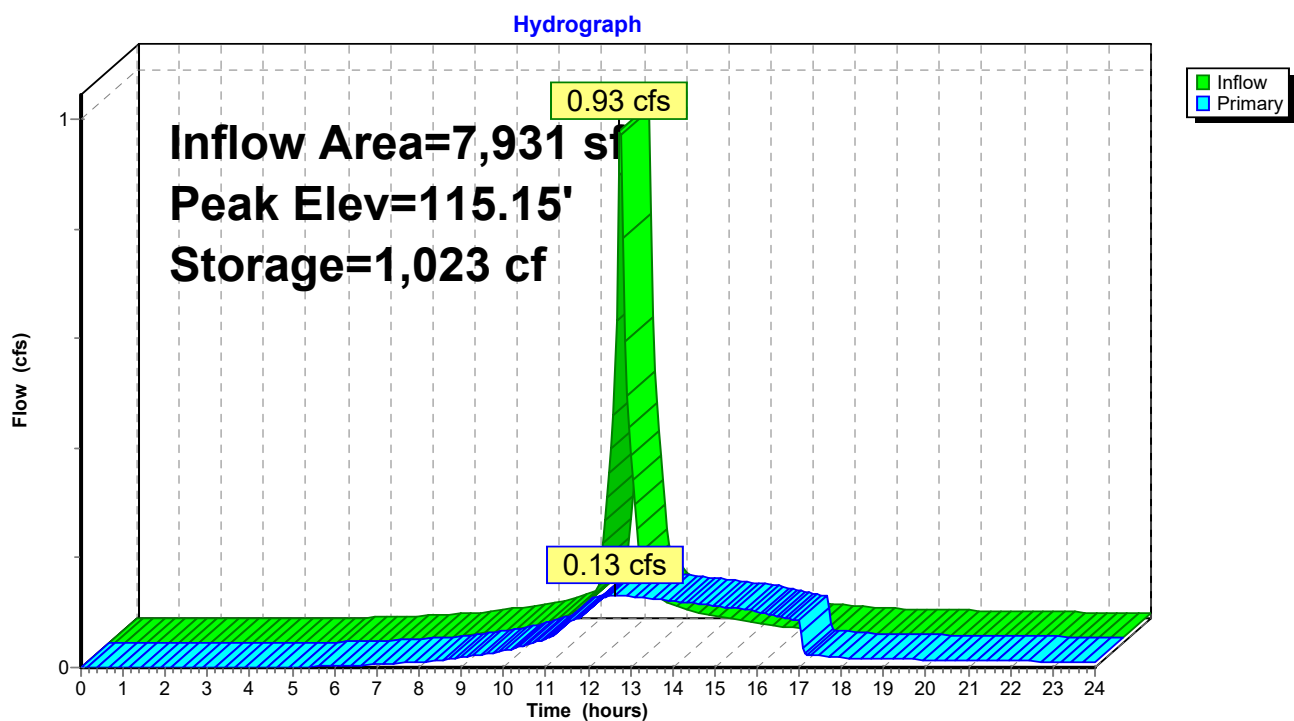
56 Chambers

129.1 cy Field

98.5 cy Stone



Pond 2P: SUBSURFACE INFILTRATION #2



POST*Type III 24-hr 25-Year Rainfall=6.16"*

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Stage-Area-Storage for Pond 2P: SUBSURFACE INFILTRATION #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.00	1,494	0
114.05	1,494	30
114.10	1,494	60
114.15	1,494	90
114.20	1,494	120
114.25	1,494	149
114.30	1,494	179
114.35	1,494	209
114.40	1,494	239
114.45	1,494	269
114.50	1,494	299
114.55	1,494	357
114.60	1,494	416
114.65	1,494	474
114.70	1,494	532
114.75	1,494	589
114.80	1,494	646
114.85	1,494	702
114.90	1,494	757
114.95	1,494	812
115.00	1,494	866
115.05	1,494	920
115.10	1,494	973
115.15	1,494	1,024
115.20	1,494	1,075
115.25	1,494	1,125
115.30	1,494	1,174
115.35	1,494	1,222
115.40	1,494	1,268
115.45	1,494	1,313
115.50	1,494	1,357
115.55	1,494	1,398
115.60	1,494	1,436
115.65	1,494	1,473
115.70	1,494	1,507
115.75	1,494	1,539
115.80	1,494	1,571
115.85	1,494	1,601
115.90	1,494	1,631
115.95	1,494	1,661
116.00	1,494	1,690
116.05	1,494	1,720
116.10	1,494	1,750
116.15	1,494	1,780
116.20	1,494	1,810
116.25	1,494	1,840
116.30	1,494	1,870

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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Pond 3P: CB3

Inflow Area = 2,010 sf, 85.82% Impervious, Inflow Depth > 5.00" for 25-Year event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 837 cf
Outflow = 0.25 cfs @ 12.09 hrs, Volume= 837 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.09 hrs, Volume= 837 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.16' @ 12.09 hrs

Flood Elev= 118.00'

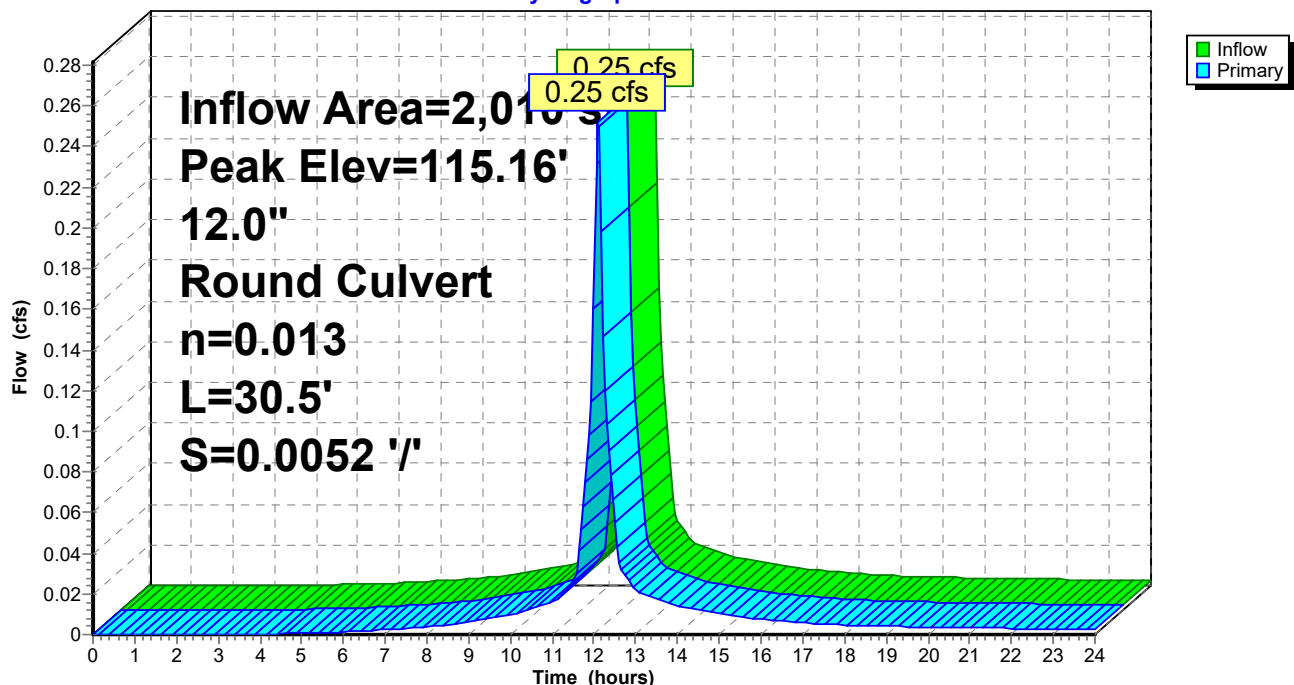
Device	Routing	Invert	Outlet Devices
#1	Primary	114.86'	12.0" Round Culvert L= 30.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.86' / 114.70' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.09 hrs HW=115.15' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.24 cfs @ 1.90 fps)

Pond 3P: CB3

Hydrograph



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Stage-Area-Storage for Pond 3P: CB3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0	117.42	0
115.32	0	116.38	0	117.44	0
115.34	0	116.40	0	117.46	0
115.36	0	116.42	0	117.48	0
115.38	0	116.44	0	117.50	0
115.40	0	116.46	0	117.52	0
115.42	0	116.48	0	117.54	0
115.44	0	116.50	0	117.56	0
115.46	0	116.52	0	117.58	0
115.48	0	116.54	0	117.60	0
115.50	0	116.56	0	117.62	0
115.52	0	116.58	0	117.64	0
115.54	0	116.60	0	117.66	0
115.56	0	116.62	0	117.68	0
115.58	0	116.64	0	117.70	0
115.60	0	116.66	0	117.72	0
115.62	0	116.68	0	117.74	0
115.64	0	116.70	0	117.76	0
115.66	0	116.72	0	117.78	0
115.68	0	116.74	0	117.80	0
115.70	0	116.76	0	117.82	0
115.72	0	116.78	0	117.84	0
115.74	0	116.80	0	117.86	0
115.76	0	116.82	0	117.88	0
115.78	0	116.84	0	117.90	0
115.80	0	116.86	0	117.92	0
115.82	0	116.88	0	117.94	0
115.84	0	116.90	0	117.96	0
115.86	0	116.92	0	117.98	0
115.88	0	116.94	0	118.00	0
115.90	0	116.96	0		

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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Pond 4P: SUBSURFACE INFILTRATION #1

[81] Warning: Exceeded Pond 10P by 1.23' @ 12.80 hrs

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
 Inflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf
 Outflow = 0.03 cfs @ 12.71 hrs, Volume= 970 cf, Atten= 89%, Lag= 37.6 min
 Primary = 0.03 cfs @ 12.71 hrs, Volume= 970 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 120.12' @ 12.71 hrs Surf.Area= 281 sf Storage= 345 cf

Plug-Flow detention time= 90.9 min calculated for 968 cf (100% of inflow)
 Center-of-Mass det. time= 90.3 min (834.7 - 744.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	118.20'	277 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 292 cf Embedded = 693 cf x 40.0% Voids
#2A	118.70'	292 cf	ADS_StormTech SC-740 b +Cap x 6 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		569 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 116.16'

Primary OutFlow Max=0.03 cfs @ 12.71 hrs HW=120.12' (Free Discharge)↑**1=Exfiltration** (Controls 0.03 cfs)

POST

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Type III 24-hr 25-Year Rainfall=6.16"

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Pond 4P: SUBSURFACE INFILTRATION #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +12.0" End Stone x 2 = 17.86' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

6 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 291.6 cf Chamber Storage

984.3 cf Field - 291.6 cf Chambers = 692.8 cf Stone x 40.0% Voids = 277.1 cf Stone Storage

Chamber Storage + Stone Storage = 568.7 cf = 0.013 af

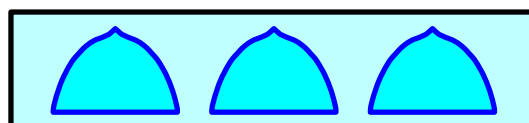
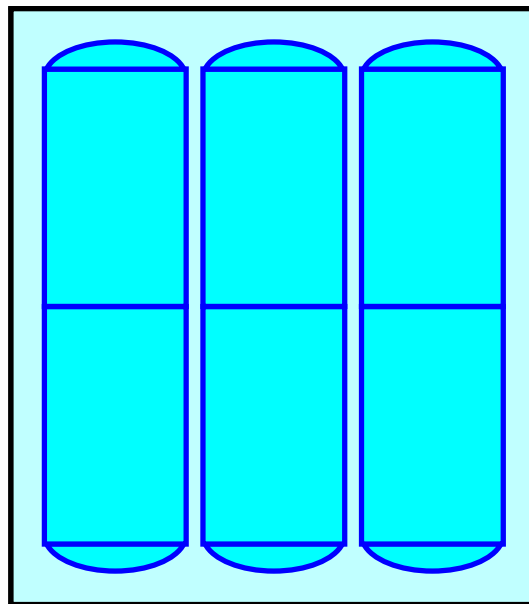
Overall Storage Efficiency = 57.8%

Overall System Size = 17.86' x 15.75' x 3.50'

6 Chambers

36.5 cy Field

25.7 cy Stone



POST

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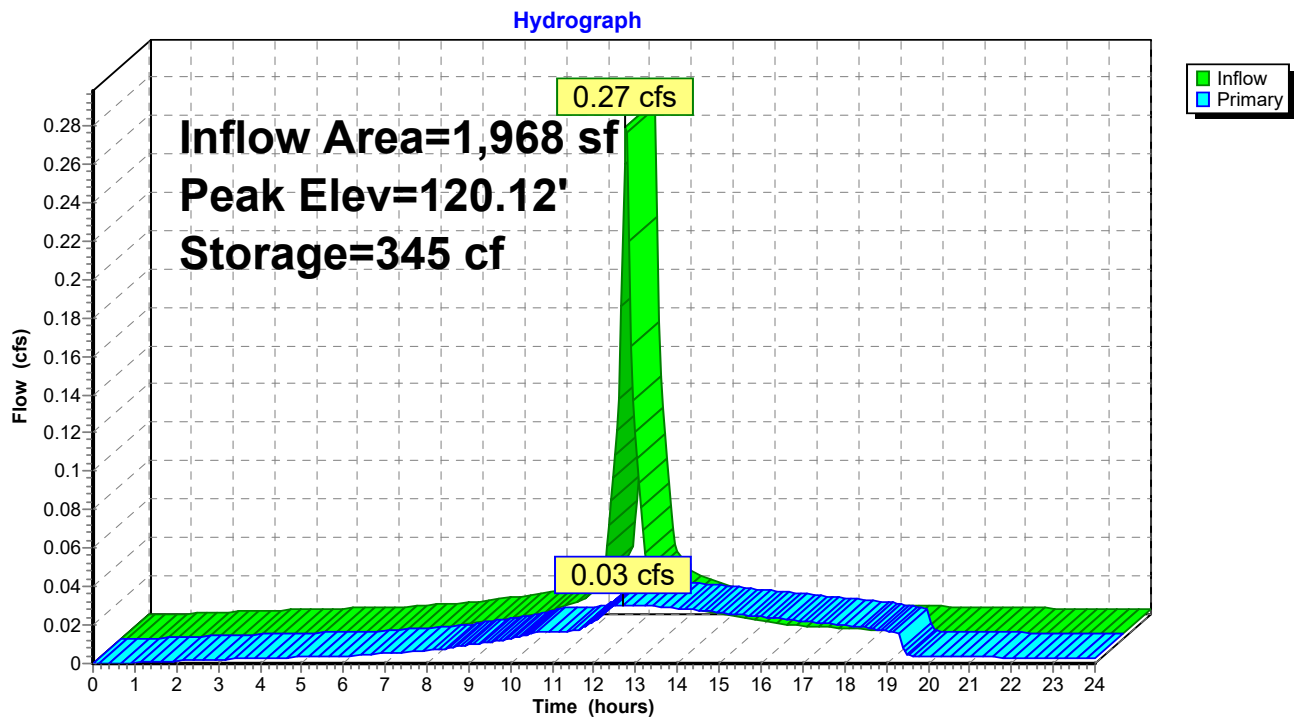
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Pond 4P: SUBSURFACE INFILTRATION #1



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Type III 24-hr 25-Year Rainfall=6.16"

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Stage-Area-Storage for Pond 4P: SUBSURFACE INFILTRATION #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
118.20	281	0	120.85	281	468
118.25	281	6	120.90	281	475
118.30	281	11	120.95	281	482
118.35	281	17	121.00	281	489
118.40	281	22	121.05	281	495
118.45	281	28	121.10	281	501
118.50	281	34	121.15	281	507
118.55	281	39	121.20	281	512
118.60	281	45	121.25	281	518
118.65	281	51	121.30	281	524
118.70	281	56	121.35	281	529
118.75	281	67	121.40	281	535
118.80	281	78	121.45	281	541
118.85	281	88	121.50	281	546
118.90	281	99	121.55	281	552
118.95	281	109	121.60	281	557
119.00	281	120	121.65	281	563
119.05	281	131	121.70	281	569
119.10	281	141			
119.15	281	151			
119.20	281	162			
119.25	281	172			
119.30	281	183			
119.35	281	193			
119.40	281	203			
119.45	281	213			
119.50	281	223			
119.55	281	234			
119.60	281	244			
119.65	281	254			
119.70	281	264			
119.75	281	273			
119.80	281	283			
119.85	281	293			
119.90	281	303			
119.95	281	312			
120.00	281	322			
120.05	281	331			
120.10	281	341			
120.15	281	350			
120.20	281	359			
120.25	281	368			
120.30	281	377			
120.35	281	386			
120.40	281	395			
120.45	281	404			
120.50	281	412			
120.55	281	421			
120.60	281	429			
120.65	281	437			
120.70	281	445			
120.75	281	453			
120.80	281	461			

POST

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Summary for Pond 5P: CB4

Inflow Area = 5,921 sf, 77.35% Impervious, Inflow Depth > 4.45" for 25-Year event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 2,196 cf
Outflow = 0.68 cfs @ 12.09 hrs, Volume= 2,196 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.68 cfs @ 12.09 hrs, Volume= 2,196 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.31' @ 12.09 hrs

Flood Elev= 117.40'

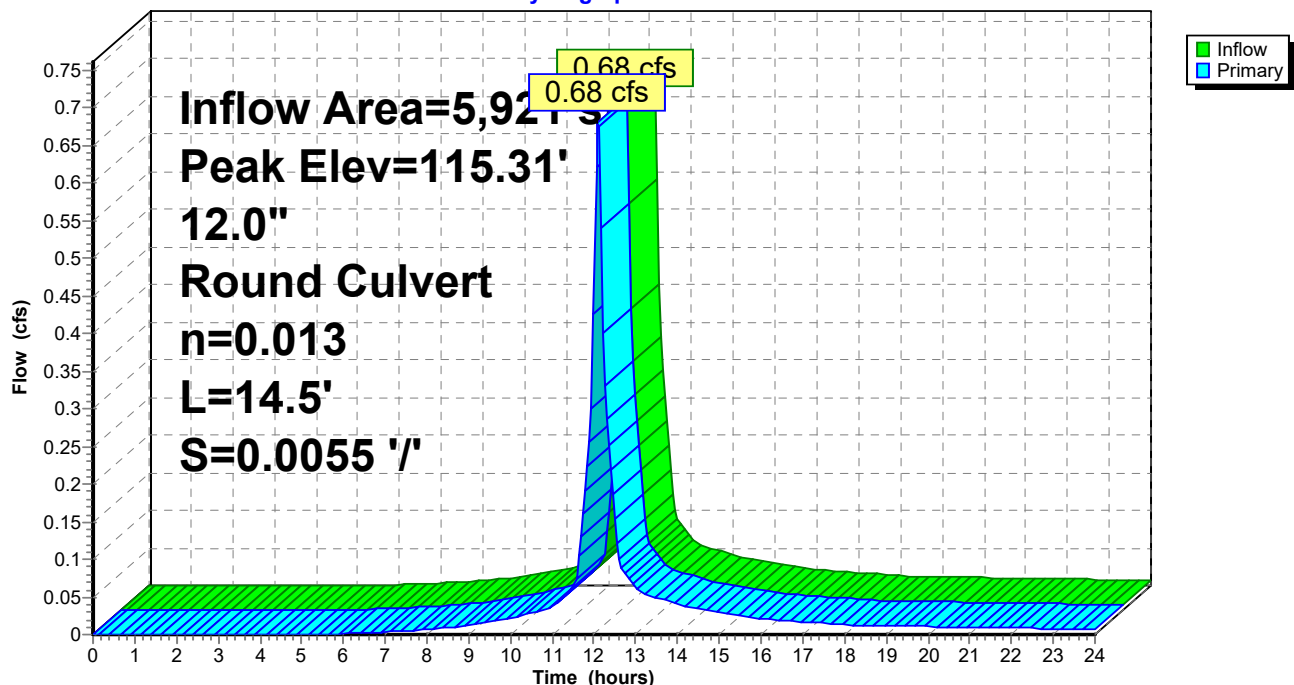
Device	Routing	Invert	Outlet Devices
#1	Primary	114.78'	12.0" Round Culvert L= 14.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.78' / 114.70' S= 0.0055 '/ S= 0.0055 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.66 cfs @ 12.09 hrs HW=115.30' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 0.66 cfs @ 2.34 fps)

Pond 5P: CB4

Hydrograph



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Stage-Area-Storage for Pond 5P: CB4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.78	0	115.84	0	116.90	0
114.80	0	115.86	0	116.92	0
114.82	0	115.88	0	116.94	0
114.84	0	115.90	0	116.96	0
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0		
115.32	0	116.38	0		
115.34	0	116.40	0		
115.36	0	116.42	0		
115.38	0	116.44	0		
115.40	0	116.46	0		
115.42	0	116.48	0		
115.44	0	116.50	0		
115.46	0	116.52	0		
115.48	0	116.54	0		
115.50	0	116.56	0		
115.52	0	116.58	0		
115.54	0	116.60	0		
115.56	0	116.62	0		
115.58	0	116.64	0		
115.60	0	116.66	0		
115.62	0	116.68	0		
115.64	0	116.70	0		
115.66	0	116.72	0		
115.68	0	116.74	0		
115.70	0	116.76	0		
115.72	0	116.78	0		
115.74	0	116.80	0		
115.76	0	116.82	0		
115.78	0	116.84	0		
115.80	0	116.86	0		
115.82	0	116.88	0		

POST

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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Pond 6P: CDS2

[81] Warning: Exceeded Pond 3P by 0.13' @ 12.10 hrs

[79] Warning: Submerged Pond 5P Primary device # 1 INLET by 0.50'

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 4.59" for 25-Year event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 3,033 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 3,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 3,033 cf
Routed to Pond 2P : SUBSURFACE INFILTRATION #2

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

Peak Elev= 115.28' @ 12.09 hrs

Flood Elev= 118.00'

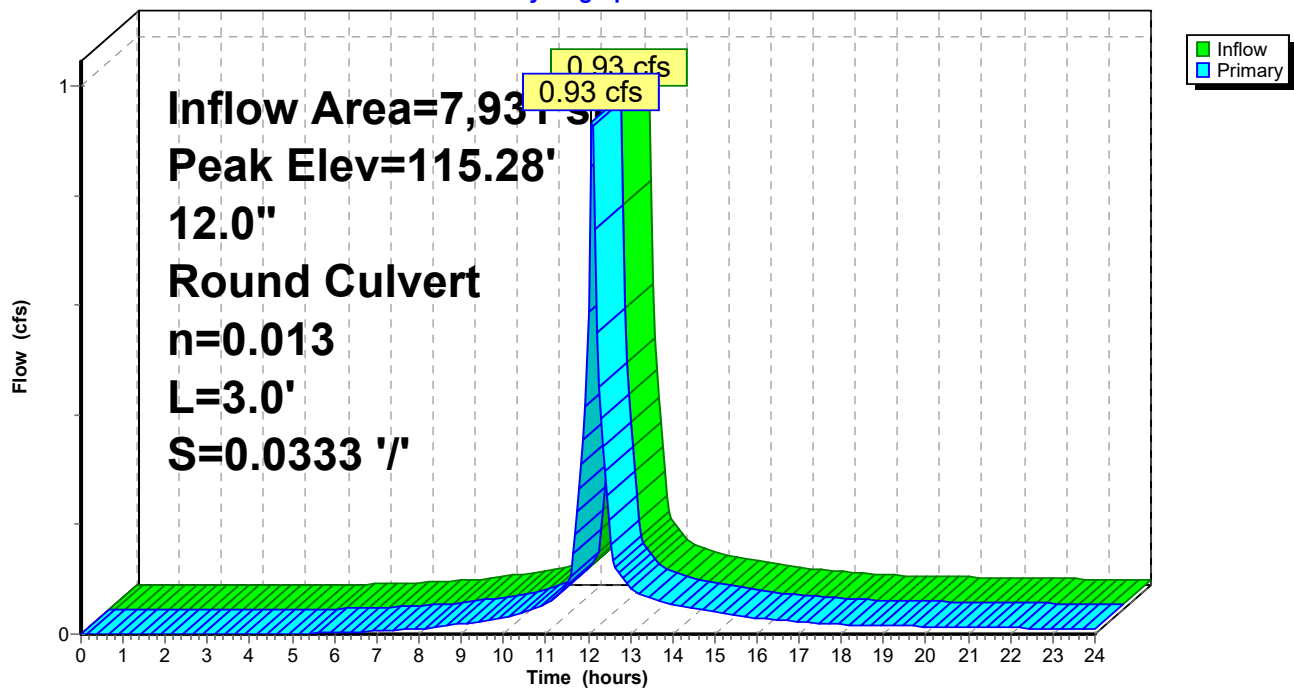
Device	Routing	Invert	Outlet Devices
#1	Primary	114.70'	12.0" Round Culvert L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.70' / 114.60' S= 0.0333 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.91 cfs @ 12.09 hrs HW=115.28' (Free Discharge)

↑1=Culvert (Barrel Controls 0.91 cfs @ 2.80 fps)

Pond 6P: CDS2

Hydrograph



POST

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Stage-Area-Storage for Pond 6P: CDS2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.70	0	117.35	0
114.75	0	117.40	0
114.80	0	117.45	0
114.85	0	117.50	0
114.90	0	117.55	0
114.95	0	117.60	0
115.00	0	117.65	0
115.05	0	117.70	0
115.10	0	117.75	0
115.15	0	117.80	0
115.20	0	117.85	0
115.25	0	117.90	0
115.30	0	117.95	0
115.35	0	118.00	0
115.40	0		
115.45	0		
115.50	0		
115.55	0		
115.60	0		
115.65	0		
115.70	0		
115.75	0		
115.80	0		
115.85	0		
115.90	0		
115.95	0		
116.00	0		
116.05	0		
116.10	0		
116.15	0		
116.20	0		
116.25	0		
116.30	0		
116.35	0		
116.40	0		
116.45	0		
116.50	0		
116.55	0		
116.60	0		
116.65	0		
116.70	0		
116.75	0		
116.80	0		
116.85	0		
116.90	0		
116.95	0		
117.00	0		
117.05	0		
117.10	0		
117.15	0		
117.20	0		
117.25	0		
117.30	0		

POST

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Type III 24-hr 25-Year Rainfall=6.16"

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Summary for Pond 7P: CB2

Inflow Area = 1,227 sf, 100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.17 cfs @ 12.09 hrs, Volume= 605 cf
Outflow = 0.17 cfs @ 12.09 hrs, Volume= 605 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.09 hrs, Volume= 605 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.40' @ 12.09 hrs

Flood Elev= 122.15'

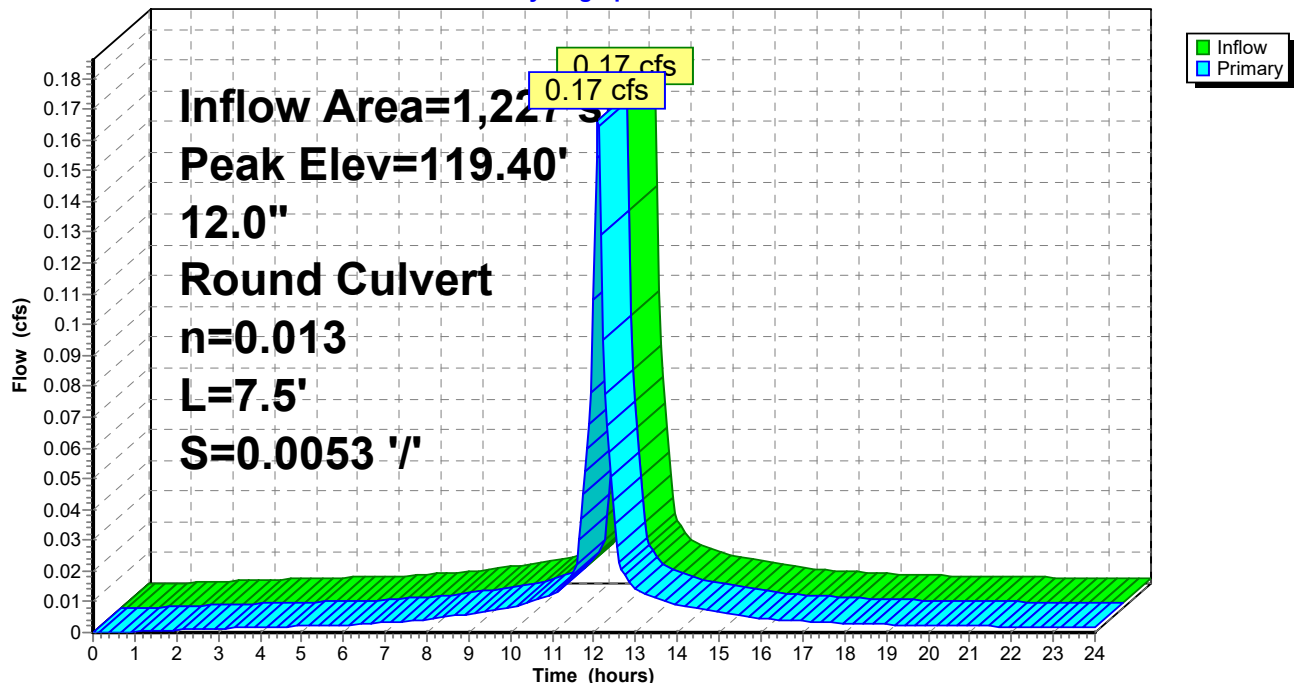
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=119.40' (Free Discharge)

↑1=Culvert (Barrel Controls 0.16 cfs @ 1.60 fps)

Pond 7P: CB2

Hydrograph



POST

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Stage-Area-Storage for Pond 7P: CB2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

POST

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Summary for Pond 8P: DMH1

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.17'

[79] Warning: Submerged Pond 7P Primary device # 1 INLET by 0.17'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.09 hrs, Volume= 971 cf
Routed to Pond 10P : CDS1

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

Peak Elev= 119.32' @ 12.09 hrs

Flood Elev= 122.50'

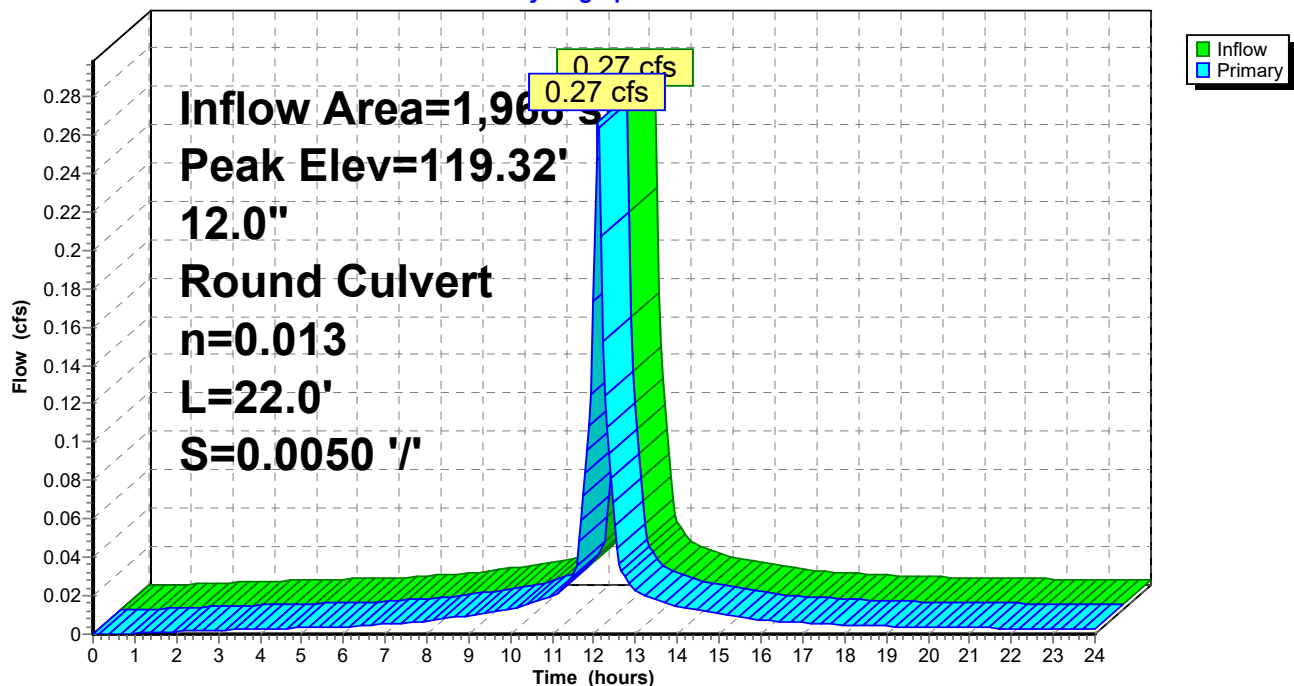
Device	Routing	Invert	Outlet Devices
#1	Primary	119.01'	12.0" Round Culvert L= 22.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.01' / 118.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.09 hrs HW=119.32' (Free Discharge)

↑1=Culvert (Barrel Controls 0.26 cfs @ 1.87 fps)

Pond 8P: DMH1

Hydrograph



POST

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Stage-Area-Storage for Pond 8P: DMH1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.01	0	121.66	0
119.06	0	121.71	0
119.11	0	121.76	0
119.16	0	121.81	0
119.21	0	121.86	0
119.26	0	121.91	0
119.31	0	121.96	0
119.36	0	122.01	0
119.41	0	122.06	0
119.46	0	122.11	0
119.51	0	122.16	0
119.56	0	122.21	0
119.61	0	122.26	0
119.66	0	122.31	0
119.71	0	122.36	0
119.76	0	122.41	0
119.81	0	122.46	0
119.86	0		
119.91	0		
119.96	0		
120.01	0		
120.06	0		
120.11	0		
120.16	0		
120.21	0		
120.26	0		
120.31	0		
120.36	0		
120.41	0		
120.46	0		
120.51	0		
120.56	0		
120.61	0		
120.66	0		
120.71	0		
120.76	0		
120.81	0		
120.86	0		
120.91	0		
120.96	0		
121.01	0		
121.06	0		
121.11	0		
121.16	0		
121.21	0		
121.26	0		
121.31	0		
121.36	0		
121.41	0		
121.46	0		
121.51	0		
121.56	0		
121.61	0		

POST

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Summary for Pond 9P: SUBSURFACE INFILTRATION #3

Inflow Area = 3,048 sf, 100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
 Inflow = 0.41 cfs @ 12.09 hrs, Volume= 1,503 cf
 Outflow = 0.05 cfs @ 12.66 hrs, Volume= 1,502 cf, Atten= 88%, Lag= 34.7 min
 Discarded = 0.05 cfs @ 12.66 hrs, Volume= 1,502 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 116.06' @ 12.66 hrs Surf.Area= 506 sf Storage= 510 cf

Plug-Flow detention time= 76.9 min calculated for 1,502 cf (100% of inflow)
 Center-of-Mass det. time= 76.5 min (820.8 - 744.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.50'	481 cf	15.75'W x 32.10'L x 3.50'H Field A 1,769 cf Overall - 567 cf Embedded = 1,202 cf x 40.0% Voids
#2A	115.00'	567 cf	ADS_StormTech SC-740 b +Cap x 12 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
1,048 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.50'

Discarded OutFlow Max=0.05 cfs @ 12.66 hrs HW=116.06' (Free Discharge)↑**1=Exfiltration** (Controls 0.05 cfs)

POST

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Pond 9P: SUBSURFACE INFILTRATION #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

12 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 567.2 cf Chamber Storage

1,769.3 cf Field - 567.2 cf Chambers = 1,202.1 cf Stone x 40.0% Voids = 480.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,048.1 cf = 0.024 af

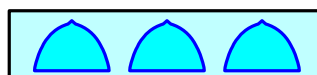
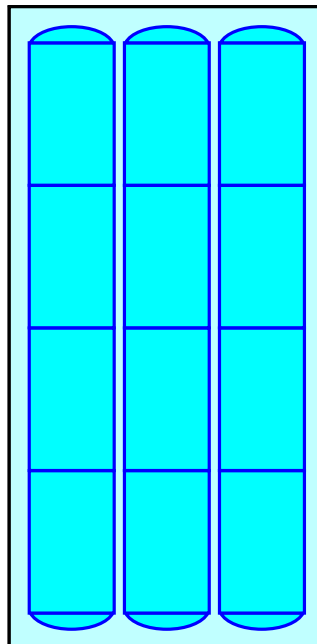
Overall Storage Efficiency = 59.2%

Overall System Size = 32.10' x 15.75' x 3.50'

12 Chambers

65.5 cy Field

44.5 cy Stone



POST

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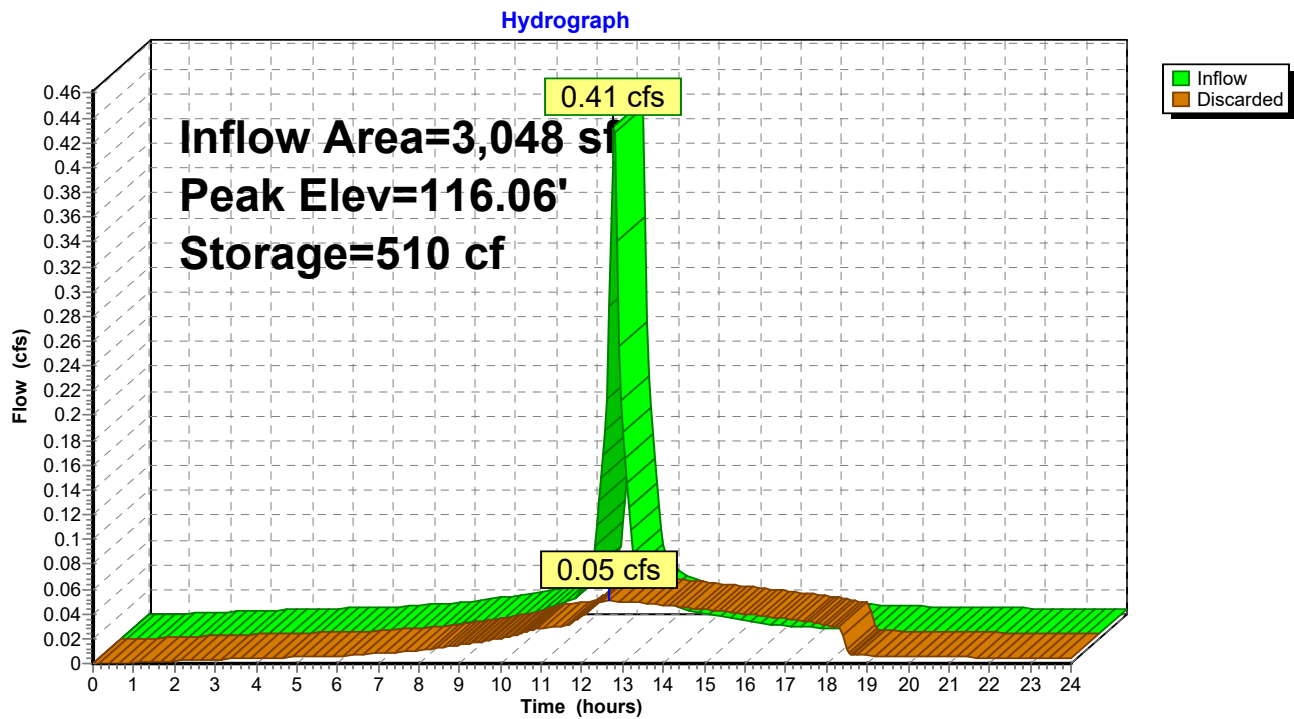
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Pond 9P: SUBSURFACE INFILTRATION #3



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Stage-Area-Storage for Pond 9P: SUBSURFACE INFILTRATION #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.50	506	0	117.15	506	867
114.55	506	10	117.20	506	880
114.60	506	20	117.25	506	892
114.65	506	30	117.30	506	904
114.70	506	40	117.35	506	915
114.75	506	51	117.40	506	926
114.80	506	61	117.45	506	937
114.85	506	71	117.50	506	947
114.90	506	81	117.55	506	957
114.95	506	91	117.60	506	967
115.00	506	101	117.65	506	977
115.05	506	121	117.70	506	987
115.10	506	141	117.75	506	998
115.15	506	161	117.80	506	1,008
115.20	506	181	117.85	506	1,018
115.25	506	200	117.90	506	1,028
115.30	506	220	117.95	506	1,038
115.35	506	240	118.00	506	1,048
115.40	506	259			
115.45	506	279			
115.50	506	298			
115.55	506	318			
115.60	506	337			
115.65	506	356			
115.70	506	375			
115.75	506	394			
115.80	506	413			
115.85	506	432			
115.90	506	451			
115.95	506	469			
116.00	506	488			
116.05	506	506			
116.10	506	524			
116.15	506	543			
116.20	506	561			
116.25	506	578			
116.30	506	596			
116.35	506	614			
116.40	506	631			
116.45	506	648			
116.50	506	665			
116.55	506	682			
116.60	506	699			
116.65	506	716			
116.70	506	732			
116.75	506	748			
116.80	506	764			
116.85	506	779			
116.90	506	795			
116.95	506	810			
117.00	506	825			
117.05	506	839			
117.10	506	853			

POST

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Summary for Pond 10P: CDS1

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.09'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.09 hrs, Volume= 971 cf
Routed to Pond 4P : SUBSURFACE INFILTRATION #1

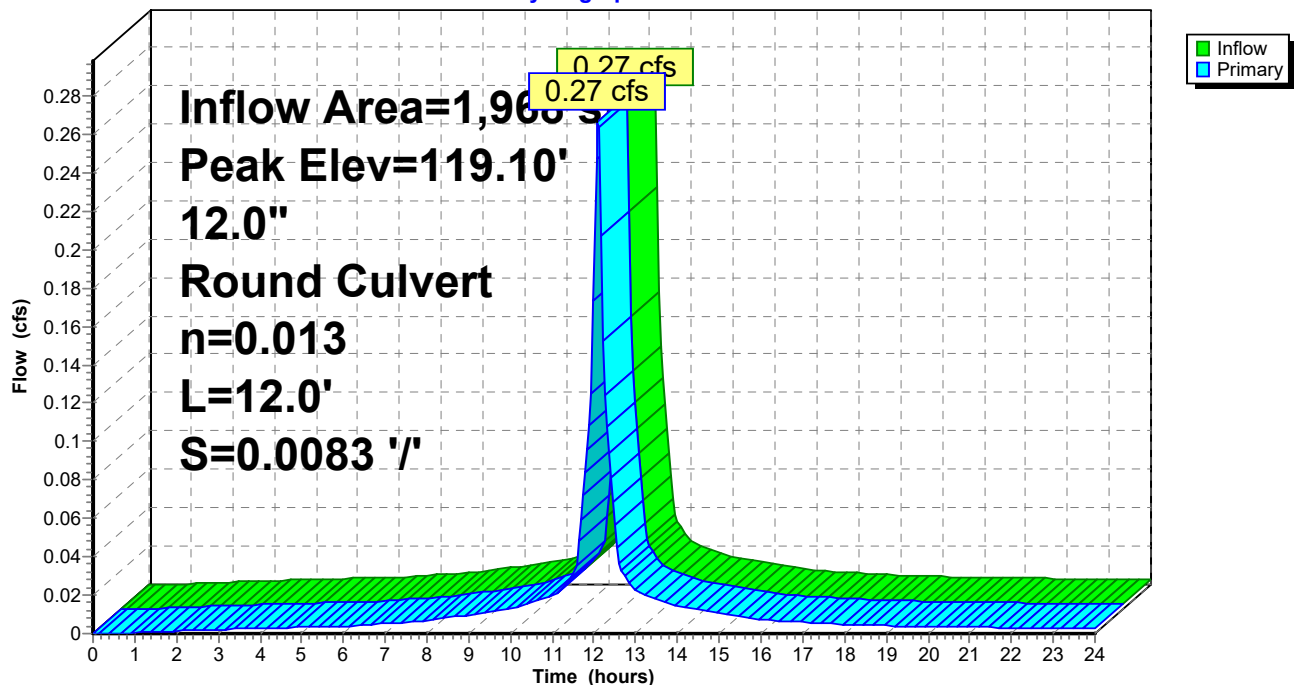
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 119.10' @ 12.09 hrs
Flood Elev= 122.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.80'	12.0" Round Culvert L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.80' / 118.70' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.09 hrs HW=119.09' (Free Discharge)
1=Culvert (Barrel Controls 0.26 cfs @ 2.00 fps)

Pond 10P: CDS1

Hydrograph



POST

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Type III 24-hr 25-Year Rainfall=6.16"

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Stage-Area-Storage for Pond 10P: CDS1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
118.80	0	121.45	0
118.85	0	121.50	0
118.90	0	121.55	0
118.95	0	121.60	0
119.00	0	121.65	0
119.05	0	121.70	0
119.10	0	121.75	0
119.15	0	121.80	0
119.20	0	121.85	0
119.25	0	121.90	0
119.30	0	121.95	0
119.35	0	122.00	0
119.40	0	122.05	0
119.45	0	122.10	0
119.50	0	122.15	0
119.55	0	122.20	0
119.60	0	122.25	0
119.65	0	122.30	0
119.70	0	122.35	0
119.75	0	122.40	0
119.80	0	122.45	0
119.85	0	122.50	0
119.90	0		
119.95	0		
120.00	0		
120.05	0		
120.10	0		
120.15	0		
120.20	0		
120.25	0		
120.30	0		
120.35	0		
120.40	0		
120.45	0		
120.50	0		
120.55	0		
120.60	0		
120.65	0		
120.70	0		
120.75	0		
120.80	0		
120.85	0		
120.90	0		
120.95	0		
121.00	0		
121.05	0		
121.10	0		
121.15	0		
121.20	0		
121.25	0		
121.30	0		
121.35	0		
121.40	0		

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Type III 24-hr 25-Year Rainfall=6.16"

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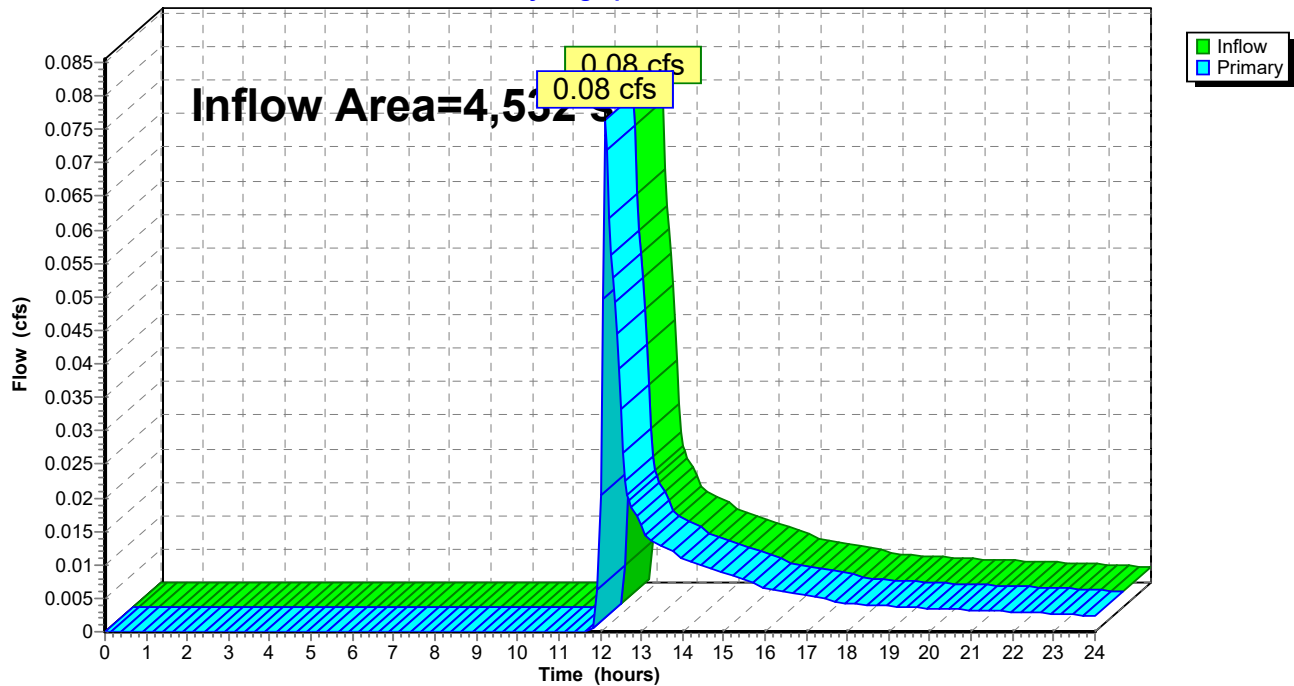
Summary for Link DP1: link

Inflow Area = 4,532 sf, 12.29% Impervious, Inflow Depth > 0.93" for 25-Year event
Inflow = 0.08 cfs @ 12.12 hrs, Volume= 352 cf
Primary = 0.08 cfs @ 12.12 hrs, Volume= 352 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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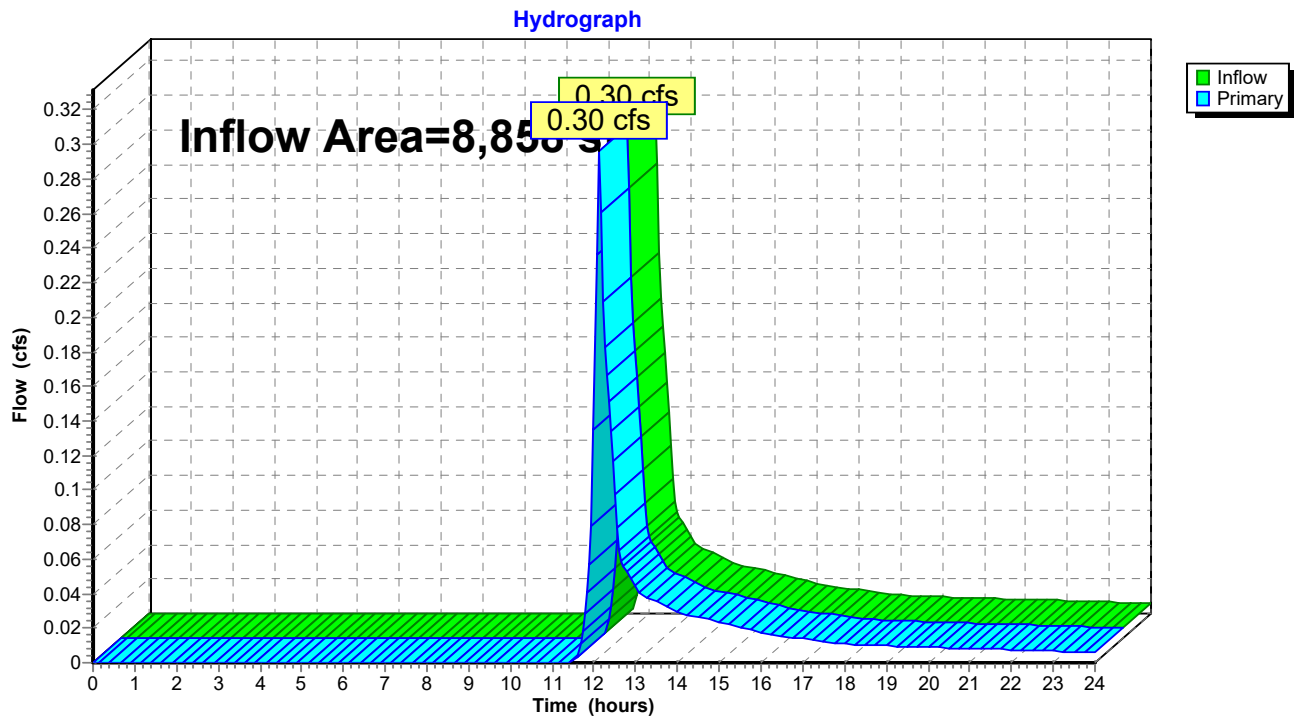
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Summary for Link DP2: link

Inflow Area = 8,858 sf, 24.43% Impervious, Inflow Depth > 1.45" for 25-Year event
Inflow = 0.30 cfs @ 12.11 hrs, Volume= 1,070 cf
Primary = 0.30 cfs @ 12.11 hrs, Volume= 1,070 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link



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Type III 24-hr 25-Year Rainfall=6.16"

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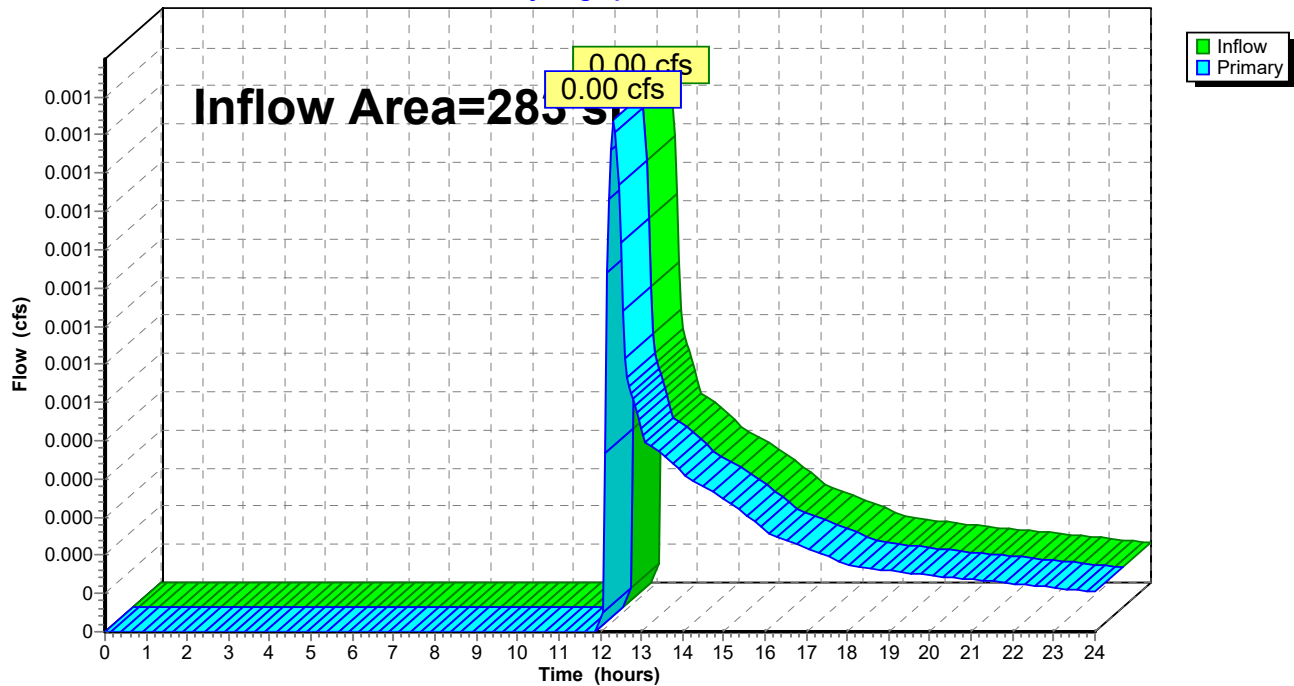
Summary for Link DP3: link

Inflow Area = 283 sf, 0.00% Impervious, Inflow Depth > 0.49" for 25-Year event
Inflow = 0.00 cfs @ 12.33 hrs, Volume= 12 cf
Primary = 0.00 cfs @ 12.33 hrs, Volume= 12 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP3: link

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.16"

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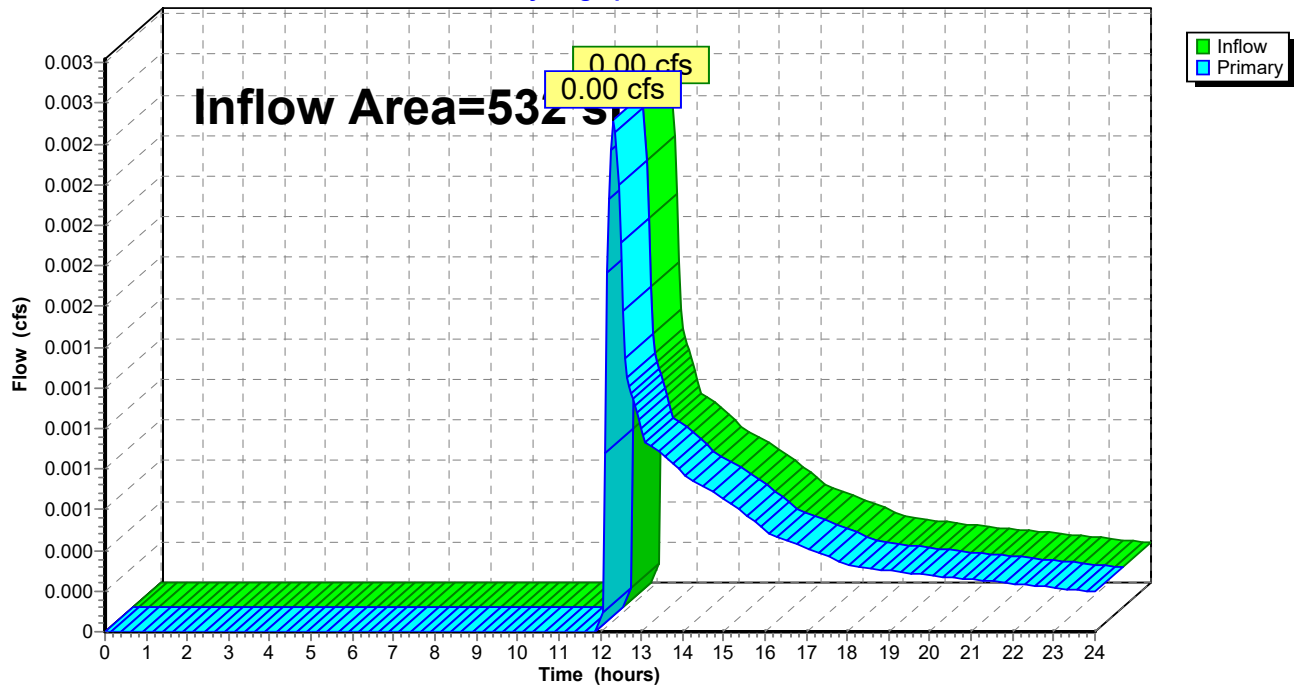
Summary for Link DP4: link

Inflow Area = 532 sf, 0.00% Impervious, Inflow Depth > 0.49" for 25-Year event
Inflow = 0.00 cfs @ 12.33 hrs, Volume= 22 cf
Primary = 0.00 cfs @ 12.33 hrs, Volume= 22 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

Hydrograph



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Type III 24-hr 100-Year Rainfall=8.94"

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

SubcatchmentP1: P1	Runoff Area=4,532 sf 12.29% Impervious Runoff Depth>2.37" Tc=6.0 min CN=46 Runoff=0.26 cfs 894 cf
SubcatchmentP2: P2	Runoff Area=8,858 sf 24.43% Impervious Runoff Depth>3.20" Tc=6.0 min CN=53 Runoff=0.72 cfs 2,362 cf
SubcatchmentP3: P3	Runoff Area=283 sf 0.00% Impervious Runoff Depth>1.57" Tc=6.0 min CN=39 Runoff=0.01 cfs 37 cf
SubcatchmentP4: P4A	Runoff Area=532 sf 0.00% Impervious Runoff Depth>1.57" Tc=6.0 min CN=39 Runoff=0.02 cfs 70 cf
SubcatchmentP5A: P5A	Runoff Area=1,227 sf 100.00% Impervious Runoff Depth>8.69" Tc=6.0 min CN=98 Runoff=0.24 cfs 889 cf
SubcatchmentP5B: P5B	Runoff Area=741 sf 100.00% Impervious Runoff Depth>8.69" Tc=6.0 min CN=98 Runoff=0.15 cfs 537 cf
SubcatchmentP6A: P6A	Runoff Area=2,010 sf 85.82% Impervious Runoff Depth>7.73" Tc=6.0 min CN=90 Runoff=0.38 cfs 1,294 cf
SubcatchmentP6B: P6B	Runoff Area=5,921 sf 77.35% Impervious Runoff Depth>7.12" Tc=6.0 min CN=85 Runoff=1.06 cfs 3,512 cf
SubcatchmentP7: P7	Runoff Area=3,048 sf 100.00% Impervious Runoff Depth>8.69" Tc=6.0 min CN=98 Runoff=0.60 cfs 2,208 cf
Pond 1P: CB1	Peak Elev=119.39' Inflow=0.15 cfs 537 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 '/' Outflow=0.15 cfs 537 cf
Pond 2P: SUBSURFACE INFILTRATION #2	Peak Elev=116.19' Storage=1,801 cf Inflow=1.44 cfs 4,807 cf Outflow=0.17 cfs 4,804 cf
Pond 3P: CB3	Peak Elev=115.23' Inflow=0.38 cfs 1,294 cf 12.0" Round Culvert n=0.013 L=30.5' S=0.0052 '/' Outflow=0.38 cfs 1,294 cf
Pond 4P: SUBSURFACE INFILTRATION #1	Peak Elev=121.58' Storage=555 cf Inflow=0.39 cfs 1,426 cf Outflow=0.04 cfs 1,425 cf
Pond 5P: CB4	Peak Elev=115.46' Inflow=1.06 cfs 3,512 cf 12.0" Round Culvert n=0.013 L=14.5' S=0.0055 '/' Outflow=1.06 cfs 3,512 cf
Pond 6P: CDS2	Peak Elev=115.47' Inflow=1.44 cfs 4,807 cf 12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=1.44 cfs 4,807 cf
Pond 7P: CB2	Peak Elev=119.46' Inflow=0.24 cfs 889 cf 12.0" Round Culvert n=0.013 L=7.5' S=0.0053 '/' Outflow=0.24 cfs 889 cf

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Pond 8P: DMH1

Peak Elev=119.39' Inflow=0.39 cfs 1,426 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0050 ' Outflow=0.39 cfs 1,426 cf

Pond 9P: SUBSURFACE INFILTRATION #3

Peak Elev=117.02' Storage=831 cf Inflow=0.60 cfs 2,208 cf
Outflow=0.06 cfs 2,207 cf

Pond 10P: CDS1

Peak Elev=119.17' Inflow=0.39 cfs 1,426 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 ' Outflow=0.39 cfs 1,426 cf

Link DP1: link

Inflow=0.26 cfs 894 cf
Primary=0.26 cfs 894 cf

Link DP2: link

Inflow=0.72 cfs 2,362 cf
Primary=0.72 cfs 2,362 cf

Link DP3: link

Inflow=0.01 cfs 37 cf
Primary=0.01 cfs 37 cf

Link DP4: link

Inflow=0.02 cfs 70 cf
Primary=0.02 cfs 70 cf

Total Runoff Area = 27,152 sf Runoff Volume = 11,803 cf Average Runoff Depth = 5.22"
48.28% Pervious = 13,110 sf 51.72% Impervious = 14,042 sf

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Summary for Subcatchment P1: P1

Runoff = 0.26 cfs @ 12.10 hrs, Volume= 894 cf, Depth> 2.37"
Routed to Link DP1 : link

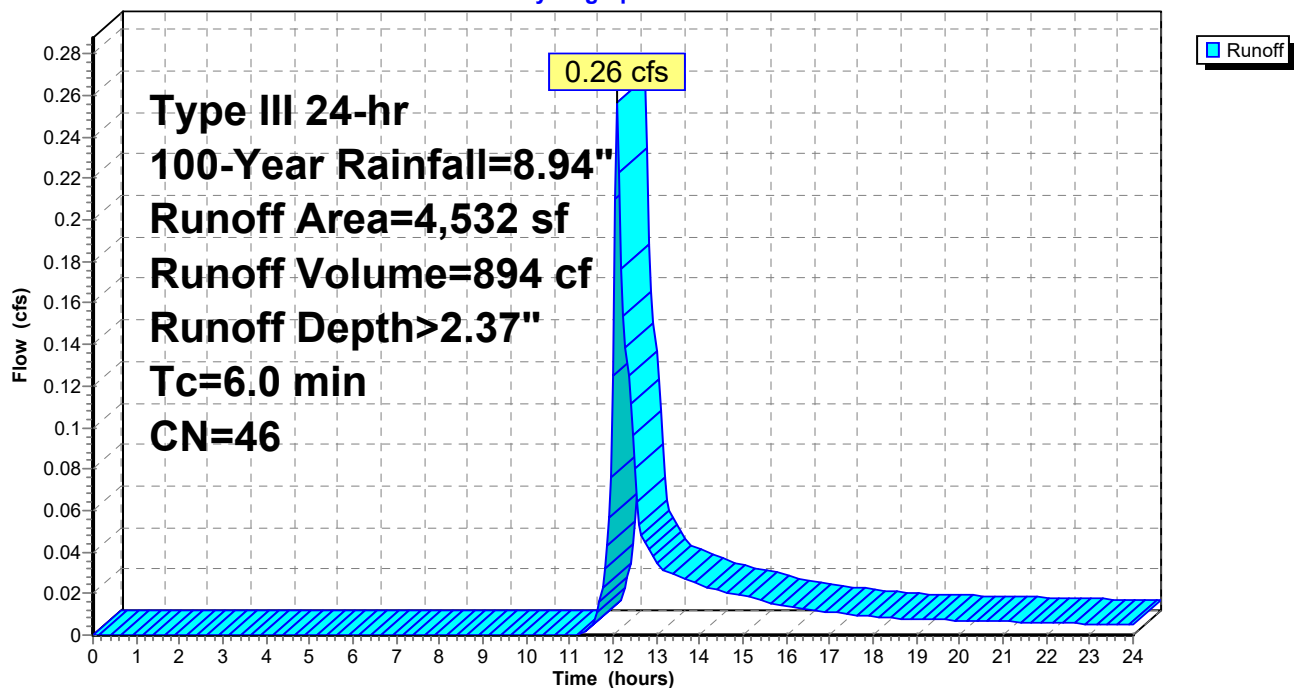
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
557	98	Roofs, HSG A
3,975	39	>75% Grass cover, Good, HSG A
4,532	46	Weighted Average
3,975		87.71% Pervious Area
557		12.29% Impervious Area

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

Subcatchment P1: P1

Hydrograph



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Summary for Subcatchment P2: P2

Runoff = 0.72 cfs @ 12.10 hrs, Volume= 2,362 cf, Depth> 3.20"
Routed to Link DP2 : link

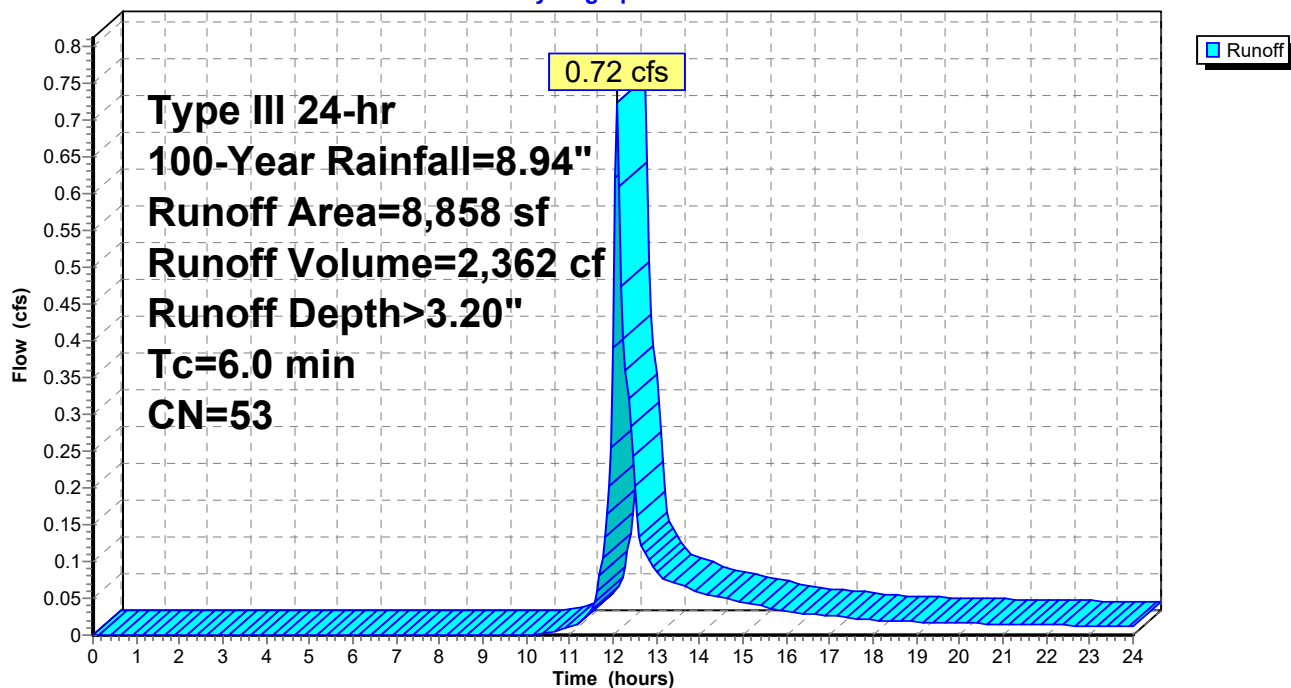
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
2,164	98	Roofs, HSG A
6,694	39	>75% Grass cover, Good, HSG A
8,858	53	Weighted Average
6,694		75.57% Pervious Area
2,164		24.43% Impervious Area

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

Subcatchment P2: P2

Hydrograph



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Summary for Subcatchment P3: P3

Runoff = 0.01 cfs @ 12.11 hrs, Volume= 37 cf, Depth> 1.57"
Routed to Link DP3 : link

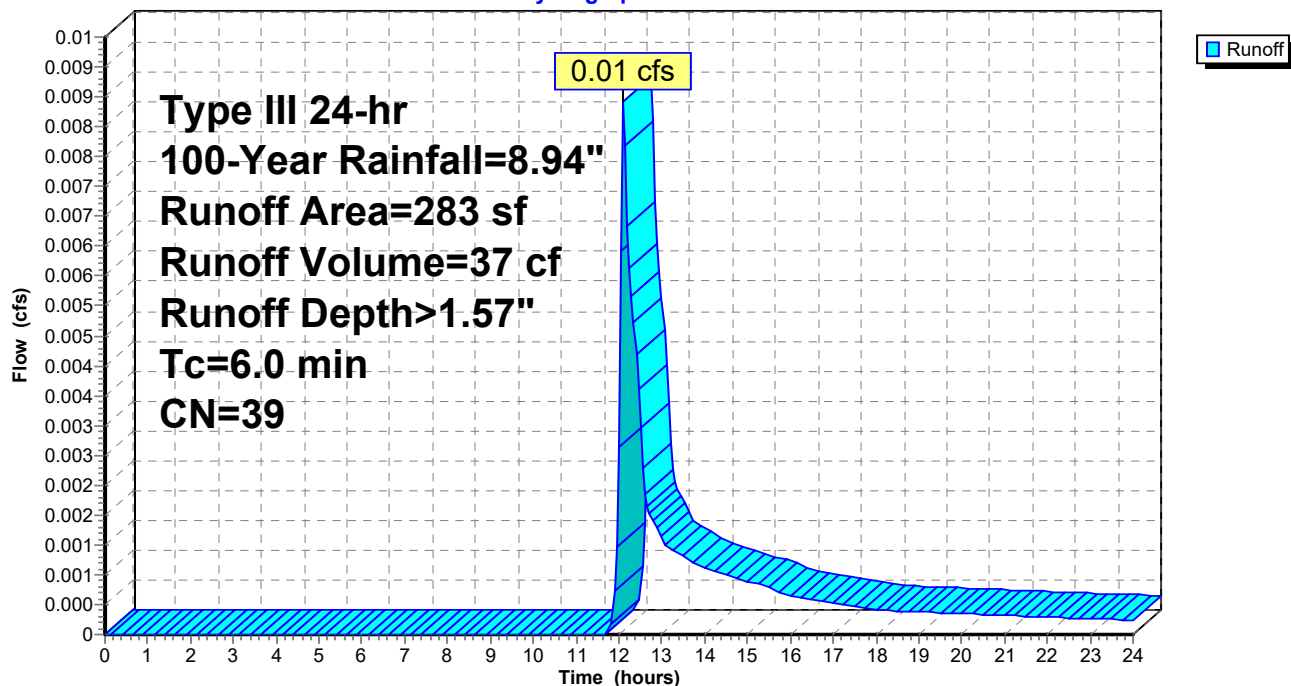
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
283	39	>75% Grass cover, Good, HSG A
283		100.00% Pervious Area

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

Subcatchment P3: P3

Hydrograph



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Summary for Subcatchment P4: P4A

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 70 cf, Depth> 1.57"
Routed to Link DP4 : link

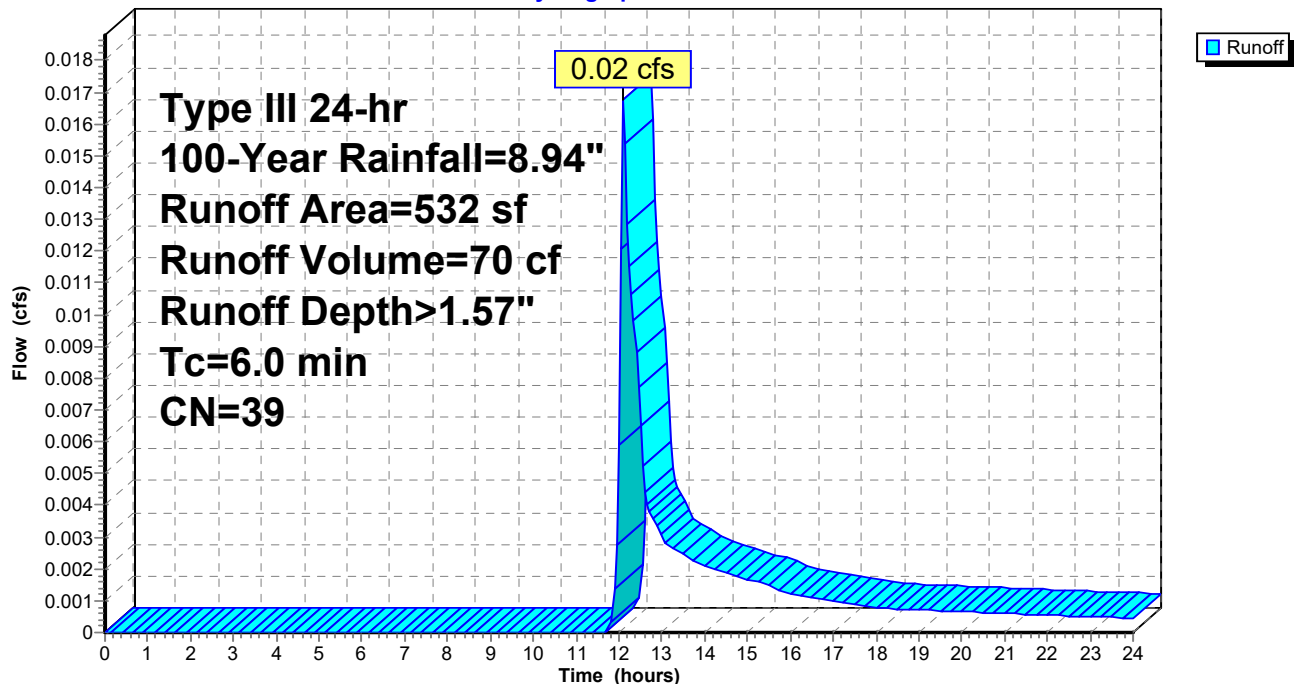
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
532	39	>75% Grass cover, Good, HSG A
532		100.00% Pervious Area

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

Subcatchment P4: P4A

Hydrograph



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Summary for Subcatchment P5A: P5A

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 889 cf, Depth> 8.69"
Routed to Pond 7P : CB2

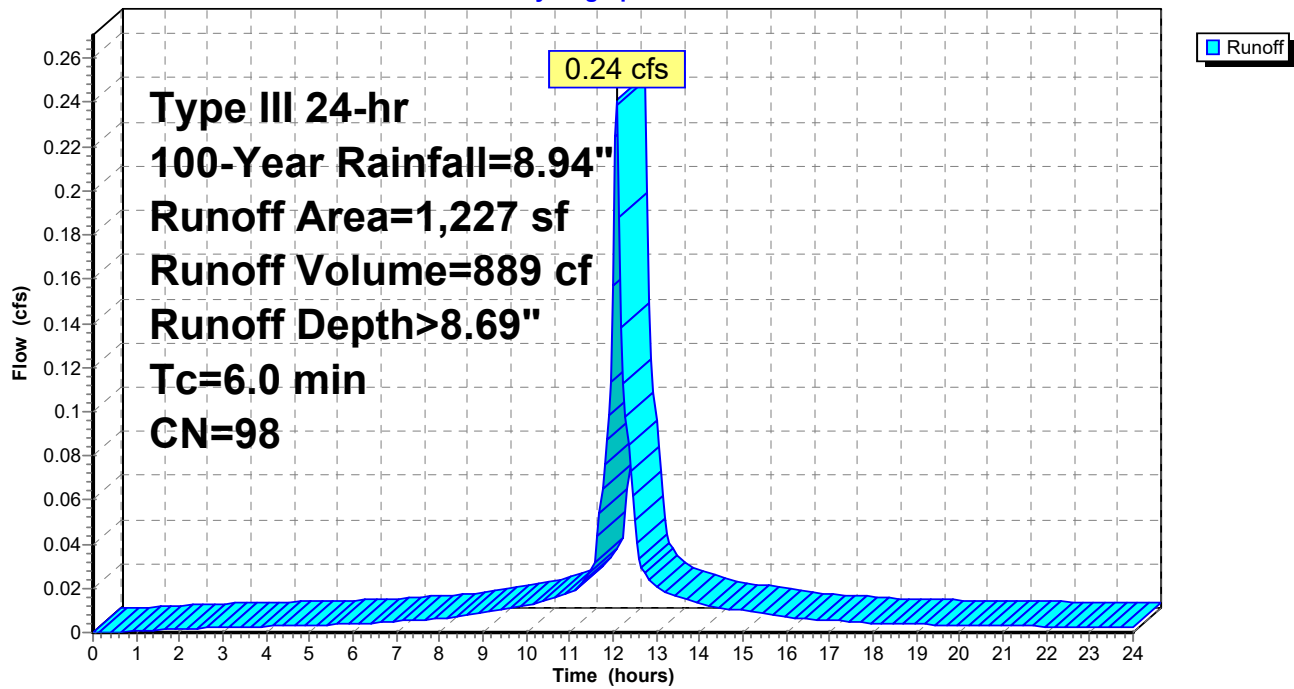
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,227	98	Paved parking, HSG A
1,227		100.00% Impervious Area

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

Subcatchment P5A: P5A

Hydrograph



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Summary for Subcatchment P5B: P5B

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 537 cf, Depth> 8.69"
Routed to Pond 1P : CB1

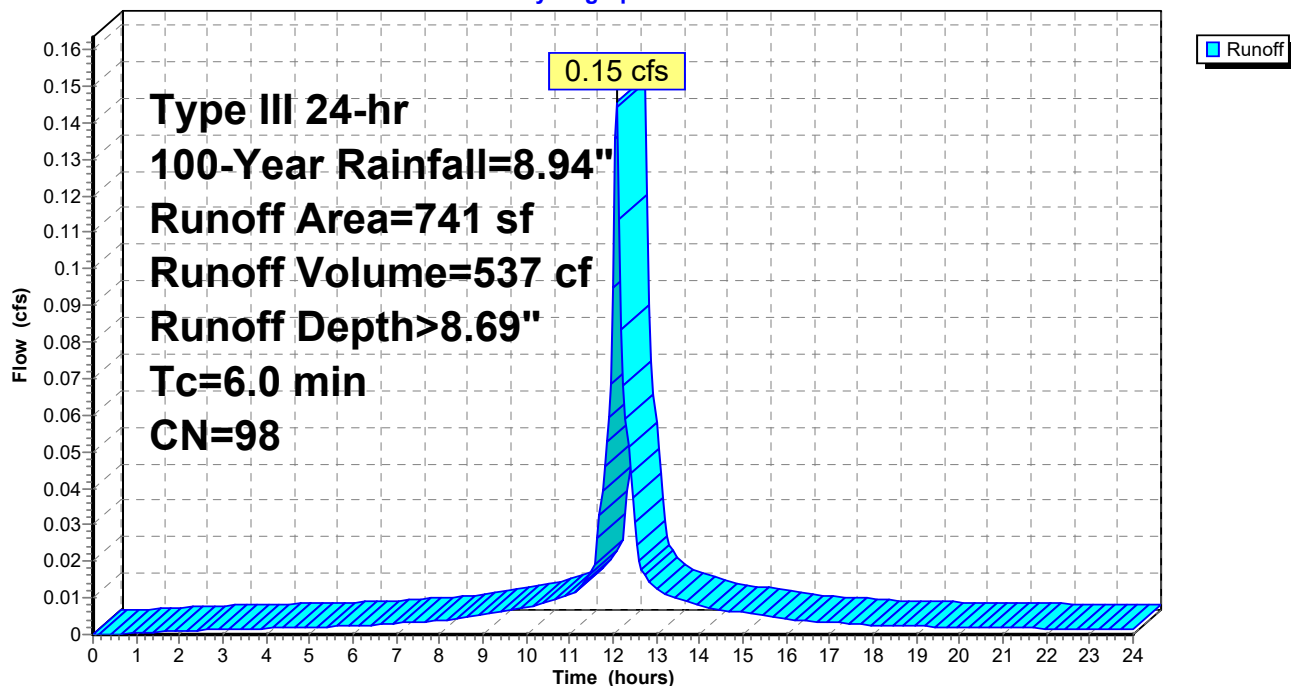
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
741	98	Paved parking, HSG A
741		100.00% Impervious Area

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

Subcatchment P5B: P5B

Hydrograph



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Summary for Subcatchment P6A: P6A

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 1,294 cf, Depth> 7.73"
Routed to Pond 3P : CB3

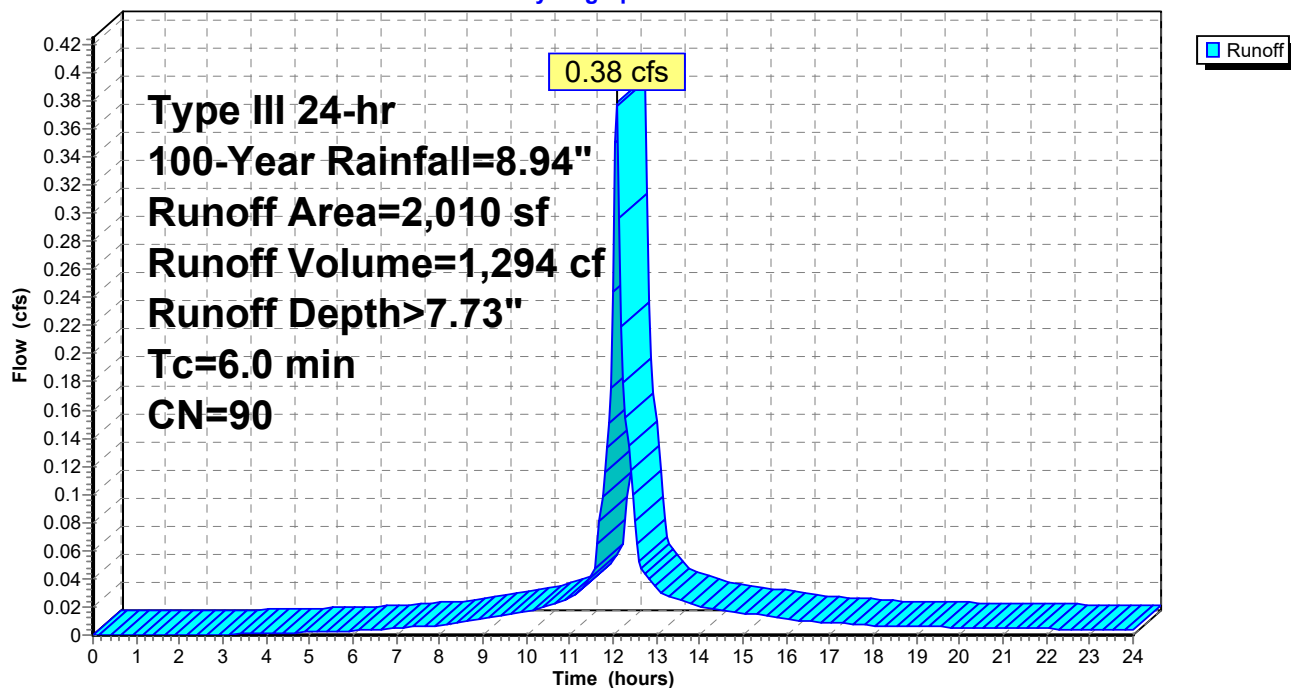
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
285	39	>75% Grass cover, Good, HSG A
1,725	98	Paved parking, HSG A
2,010	90	Weighted Average
285		14.18% Pervious Area
1,725		85.82% Impervious Area

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

Subcatchment P6A: P6A

Hydrograph



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Summary for Subcatchment P6B: P6B

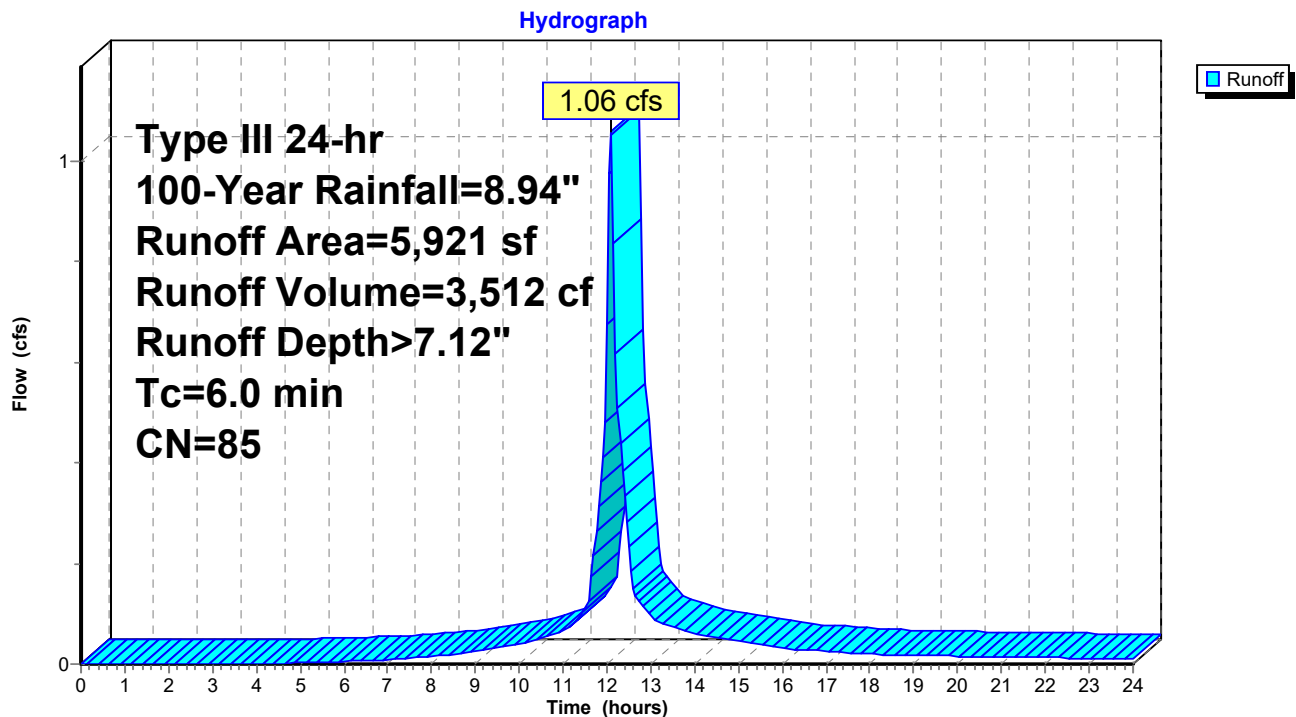
Runoff = 1.06 cfs @ 12.09 hrs, Volume= 3,512 cf, Depth> 7.12"
Routed to Pond 5P : CB4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,341	39	>75% Grass cover, Good, HSG A
4,580	98	Paved parking, HSG A
5,921	85	Weighted Average
1,341		22.65% Pervious Area
4,580		77.35% Impervious Area

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

Subcatchment P6B: P6B



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Summary for Subcatchment P7: P7

Runoff = 0.60 cfs @ 12.09 hrs, Volume= 2,208 cf, Depth> 8.69"
Routed to Pond 9P : SUBSURFACE INFILTRATION #3

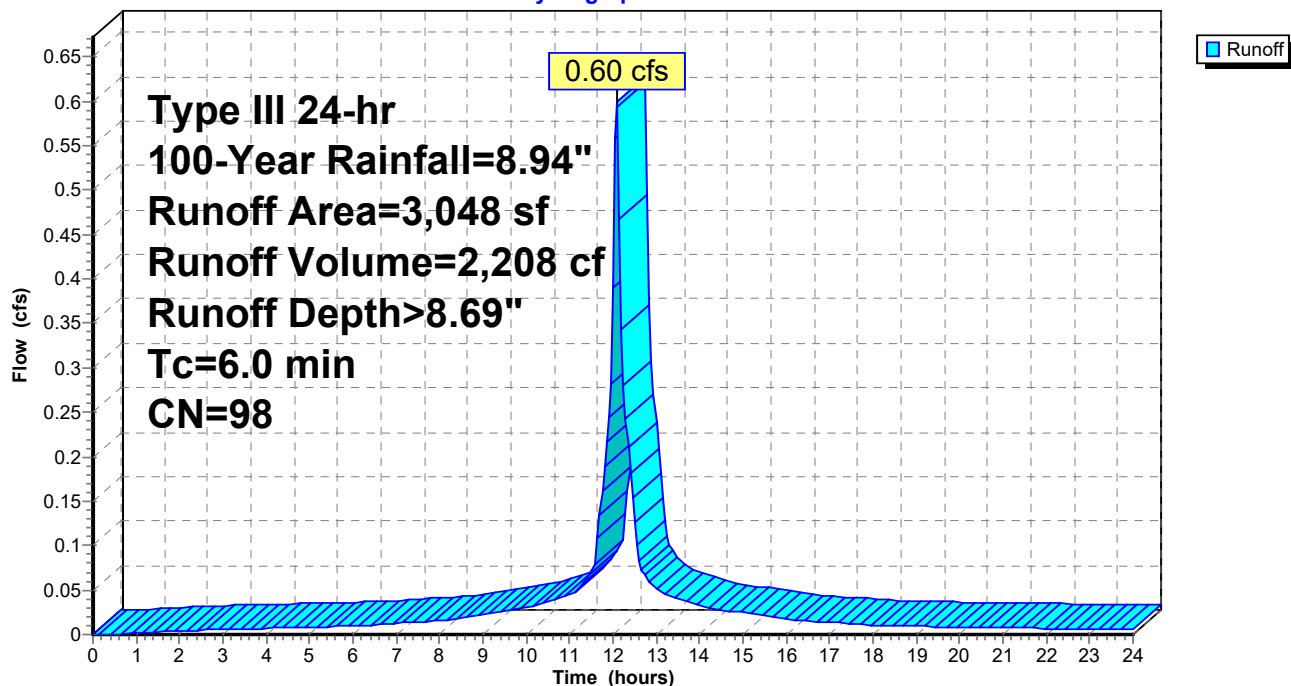
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
3,048	98	Roofs, HSG A
3,048		100.00% Impervious Area

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

Subcatchment P7: P7

Hydrograph



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Summary for Pond 1P: CB1

Inflow Area = 741 sf, 100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 537 cf
Outflow = 0.15 cfs @ 12.09 hrs, Volume= 537 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 12.09 hrs, Volume= 537 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.39' @ 12.09 hrs

Flood Elev= 122.15'

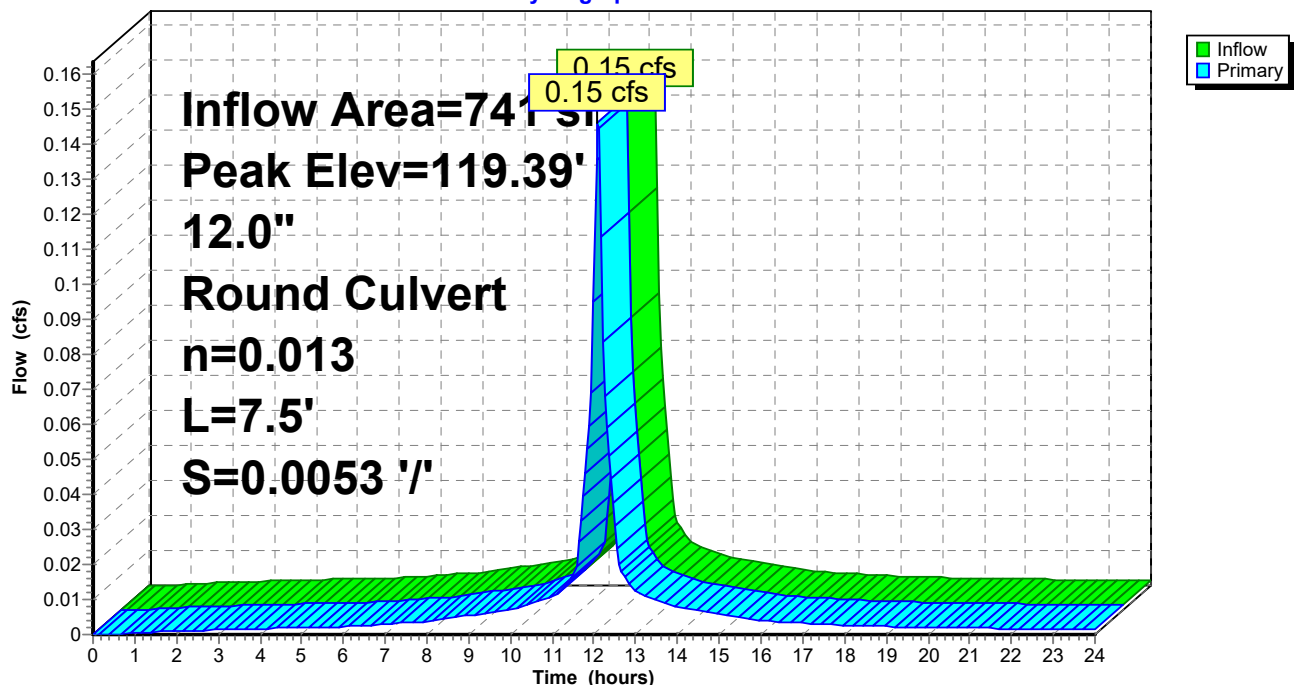
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.14 cfs @ 12.09 hrs HW=119.38' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.14 cfs @ 1.55 fps)

Pond 1P: CB1

Hydrograph



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Stage-Area-Storage for Pond 1P: CB1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

POST

Type III 24-hr 100-Year Rainfall=8.94"

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Summary for Pond 2P: SUBSURFACE INFILTRATION #2

[81] Warning: Exceeded Pond 6P by 1.26' @ 12.80 hrs

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 7.27" for 100-Year event
 Inflow = 1.44 cfs @ 12.09 hrs, Volume= 4,807 cf
 Outflow = 0.17 cfs @ 12.69 hrs, Volume= 4,804 cf, Atten= 88%, Lag= 36.4 min
 Primary = 0.17 cfs @ 12.69 hrs, Volume= 4,804 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 116.19' @ 12.69 hrs Surf.Area= 1,494 sf Storage= 1,801 cf

Plug-Flow detention time= 93.8 min calculated for 4,804 cf (100% of inflow)
 Center-of-Mass det. time= 93.5 min (876.0 - 782.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.00'	1,064 cf	28.17'W x 53.04'L x 2.33'H Field A 3,486 cf Overall - 826 cf Embedded = 2,660 cf x 40.0% Voids
#2A	114.50'	826 cf	ADS_StormTech SC-310 +Cap x 56 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
		1,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	114.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.00'

Primary OutFlow Max=0.17 cfs @ 12.69 hrs HW=116.19' (Free Discharge)
 ↑1=Exfiltration (Controls 0.17 cfs)

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Type III 24-hr 100-Year Rainfall=8.94"

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Pond 2P: SUBSURFACE INFILTRATION #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

8 Rows x 34.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 28.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

56 Chambers x 14.7 cf = 825.5 cf Chamber Storage

3,485.9 cf Field - 825.5 cf Chambers = 2,660.4 cf Stone x 40.0% Voids = 1,064.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,889.7 cf = 0.043 af

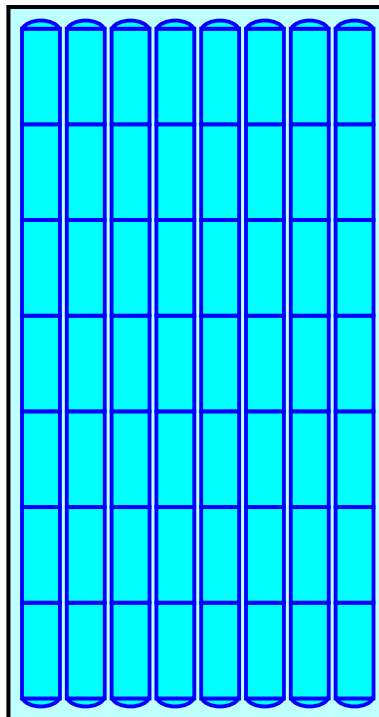
Overall Storage Efficiency = 54.2%

Overall System Size = 53.04' x 28.17' x 2.33'

56 Chambers

129.1 cy Field

98.5 cy Stone



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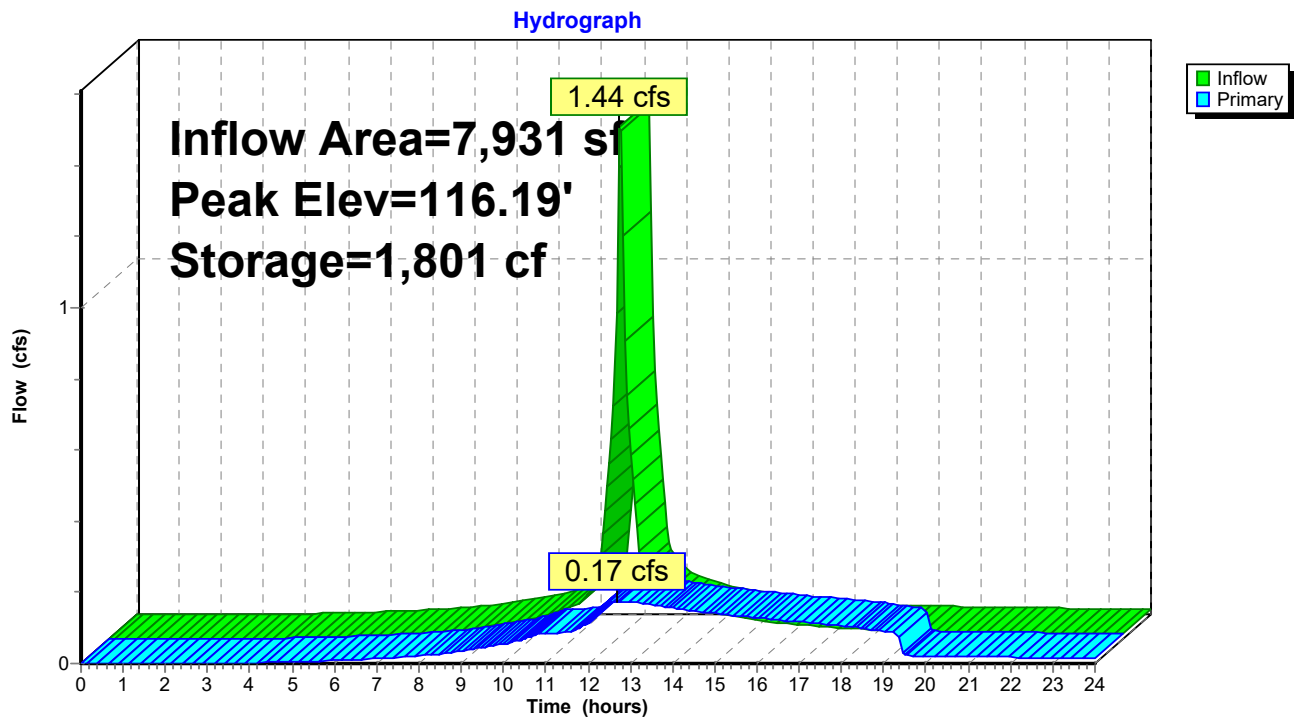
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Type III 24-hr 100-Year Rainfall=8.94"

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Pond 2P: SUBSURFACE INFILTRATION #2



POST*Type III 24-hr 100-Year Rainfall=8.94"*

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Stage-Area-Storage for Pond 2P: SUBSURFACE INFILTRATION #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.00	1,494	0
114.05	1,494	30
114.10	1,494	60
114.15	1,494	90
114.20	1,494	120
114.25	1,494	149
114.30	1,494	179
114.35	1,494	209
114.40	1,494	239
114.45	1,494	269
114.50	1,494	299
114.55	1,494	357
114.60	1,494	416
114.65	1,494	474
114.70	1,494	532
114.75	1,494	589
114.80	1,494	646
114.85	1,494	702
114.90	1,494	757
114.95	1,494	812
115.00	1,494	866
115.05	1,494	920
115.10	1,494	973
115.15	1,494	1,024
115.20	1,494	1,075
115.25	1,494	1,125
115.30	1,494	1,174
115.35	1,494	1,222
115.40	1,494	1,268
115.45	1,494	1,313
115.50	1,494	1,357
115.55	1,494	1,398
115.60	1,494	1,436
115.65	1,494	1,473
115.70	1,494	1,507
115.75	1,494	1,539
115.80	1,494	1,571
115.85	1,494	1,601
115.90	1,494	1,631
115.95	1,494	1,661
116.00	1,494	1,690
116.05	1,494	1,720
116.10	1,494	1,750
116.15	1,494	1,780
116.20	1,494	1,810
116.25	1,494	1,840
116.30	1,494	1,870

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Type III 24-hr 100-Year Rainfall=8.94"

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Summary for Pond 3P: CB3

Inflow Area = 2,010 sf, 85.82% Impervious, Inflow Depth > 7.73" for 100-Year event
Inflow = 0.38 cfs @ 12.09 hrs, Volume= 1,294 cf
Outflow = 0.38 cfs @ 12.09 hrs, Volume= 1,294 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.09 hrs, Volume= 1,294 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.23' @ 12.09 hrs

Flood Elev= 118.00'

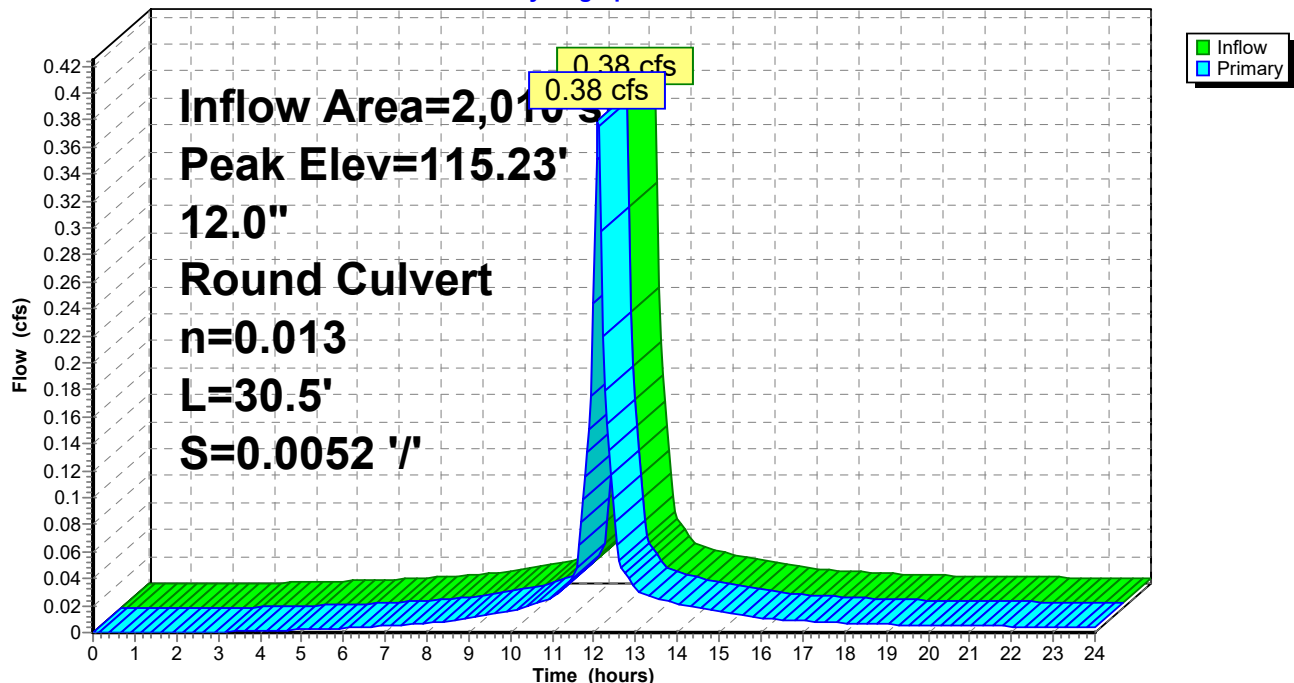
Device	Routing	Invert	Outlet Devices
#1	Primary	114.86'	12.0" Round Culvert L= 30.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.86' / 114.70' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.37 cfs @ 12.09 hrs HW=115.23' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.37 cfs @ 2.11 fps)

Pond 3P: CB3

Hydrograph



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Stage-Area-Storage for Pond 3P: CB3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0	117.42	0
115.32	0	116.38	0	117.44	0
115.34	0	116.40	0	117.46	0
115.36	0	116.42	0	117.48	0
115.38	0	116.44	0	117.50	0
115.40	0	116.46	0	117.52	0
115.42	0	116.48	0	117.54	0
115.44	0	116.50	0	117.56	0
115.46	0	116.52	0	117.58	0
115.48	0	116.54	0	117.60	0
115.50	0	116.56	0	117.62	0
115.52	0	116.58	0	117.64	0
115.54	0	116.60	0	117.66	0
115.56	0	116.62	0	117.68	0
115.58	0	116.64	0	117.70	0
115.60	0	116.66	0	117.72	0
115.62	0	116.68	0	117.74	0
115.64	0	116.70	0	117.76	0
115.66	0	116.72	0	117.78	0
115.68	0	116.74	0	117.80	0
115.70	0	116.76	0	117.82	0
115.72	0	116.78	0	117.84	0
115.74	0	116.80	0	117.86	0
115.76	0	116.82	0	117.88	0
115.78	0	116.84	0	117.90	0
115.80	0	116.86	0	117.92	0
115.82	0	116.88	0	117.94	0
115.84	0	116.90	0	117.96	0
115.86	0	116.92	0	117.98	0
115.88	0	116.94	0	118.00	0
115.90	0	116.96	0		

POST

Type III 24-hr 100-Year Rainfall=8.94"

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Summary for Pond 4P: SUBSURFACE INFILTRATION #1

[81] Warning: Exceeded Pond 10P by 2.67' @ 12.80 hrs

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
 Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf
 Outflow = 0.04 cfs @ 12.77 hrs, Volume= 1,425 cf, Atten= 89%, Lag= 41.2 min
 Primary = 0.04 cfs @ 12.77 hrs, Volume= 1,425 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 121.58' @ 12.77 hrs Surf.Area= 281 sf Storage= 555 cf

Plug-Flow detention time= 127.1 min calculated for 1,422 cf (100% of inflow)
 Center-of-Mass det. time= 126.4 min (865.9 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	118.20'	277 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 292 cf Embedded = 693 cf x 40.0% Voids
#2A	118.70'	292 cf	ADS_StormTech SC-740 b +Cap x 6 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		569 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 116.16'

Primary OutFlow Max=0.04 cfs @ 12.77 hrs HW=121.58' (Free Discharge)↑ **1=Exfiltration** (Controls 0.04 cfs)

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Pond 4P: SUBSURFACE INFILTRATION #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +12.0" End Stone x 2 = 17.86' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

6 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 291.6 cf Chamber Storage

984.3 cf Field - 291.6 cf Chambers = 692.8 cf Stone x 40.0% Voids = 277.1 cf Stone Storage

Chamber Storage + Stone Storage = 568.7 cf = 0.013 af

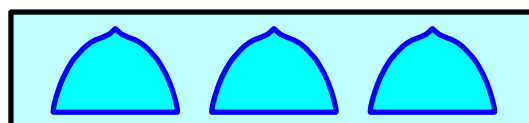
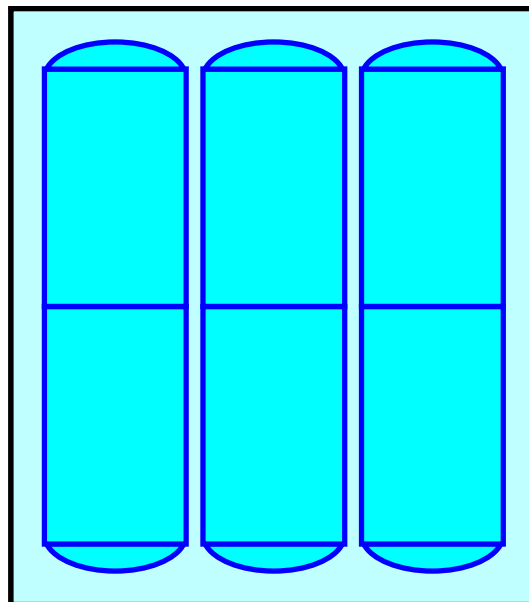
Overall Storage Efficiency = 57.8%

Overall System Size = 17.86' x 15.75' x 3.50'

6 Chambers

36.5 cy Field

25.7 cy Stone



POST

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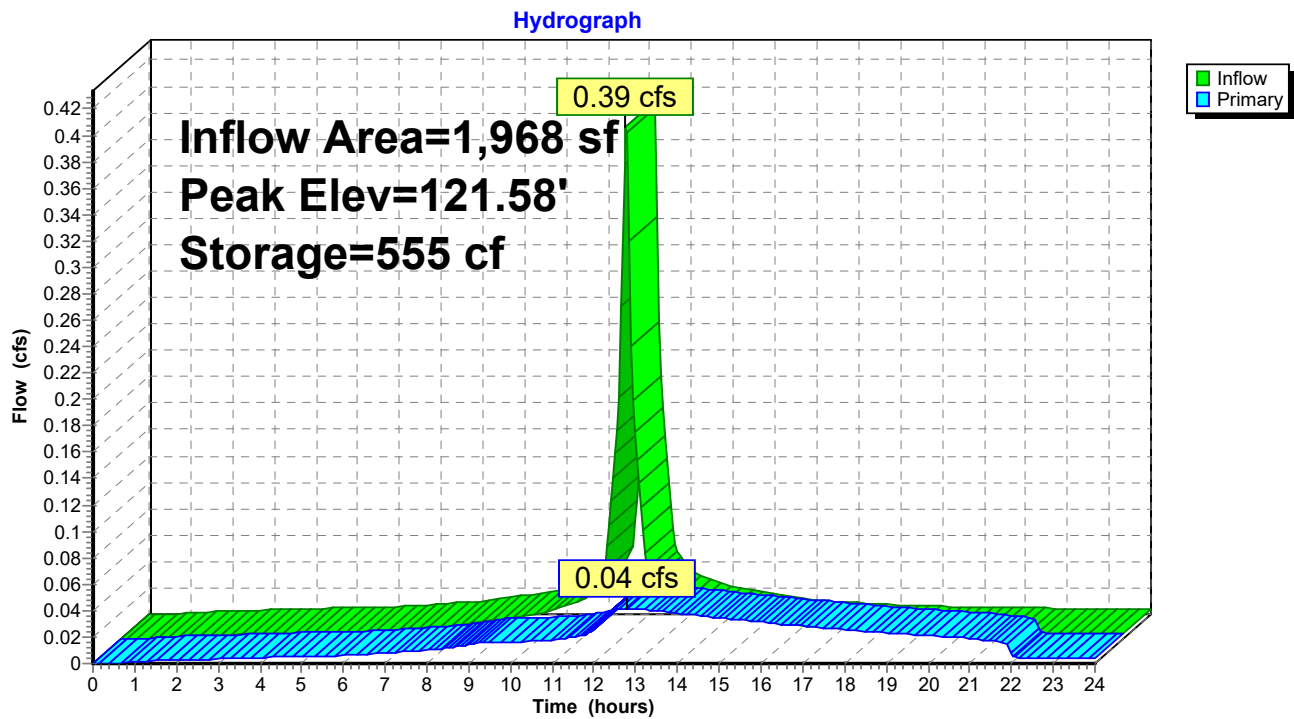
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Pond 4P: SUBSURFACE INFILTRATION #1



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Stage-Area-Storage for Pond 4P: SUBSURFACE INFILTRATION #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
118.20	281	0	120.85	281	468
118.25	281	6	120.90	281	475
118.30	281	11	120.95	281	482
118.35	281	17	121.00	281	489
118.40	281	22	121.05	281	495
118.45	281	28	121.10	281	501
118.50	281	34	121.15	281	507
118.55	281	39	121.20	281	512
118.60	281	45	121.25	281	518
118.65	281	51	121.30	281	524
118.70	281	56	121.35	281	529
118.75	281	67	121.40	281	535
118.80	281	78	121.45	281	541
118.85	281	88	121.50	281	546
118.90	281	99	121.55	281	552
118.95	281	109	121.60	281	557
119.00	281	120	121.65	281	563
119.05	281	131	121.70	281	569
119.10	281	141			
119.15	281	151			
119.20	281	162			
119.25	281	172			
119.30	281	183			
119.35	281	193			
119.40	281	203			
119.45	281	213			
119.50	281	223			
119.55	281	234			
119.60	281	244			
119.65	281	254			
119.70	281	264			
119.75	281	273			
119.80	281	283			
119.85	281	293			
119.90	281	303			
119.95	281	312			
120.00	281	322			
120.05	281	331			
120.10	281	341			
120.15	281	350			
120.20	281	359			
120.25	281	368			
120.30	281	377			
120.35	281	386			
120.40	281	395			
120.45	281	404			
120.50	281	412			
120.55	281	421			
120.60	281	429			
120.65	281	437			
120.70	281	445			
120.75	281	453			
120.80	281	461			

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Summary for Pond 5P: CB4

Inflow Area = 5,921 sf, 77.35% Impervious, Inflow Depth > 7.12" for 100-Year event
Inflow = 1.06 cfs @ 12.09 hrs, Volume= 3,512 cf
Outflow = 1.06 cfs @ 12.09 hrs, Volume= 3,512 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.06 cfs @ 12.09 hrs, Volume= 3,512 cf
Routed to Pond 6P : CDS2

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

Peak Elev= 115.46' @ 12.09 hrs

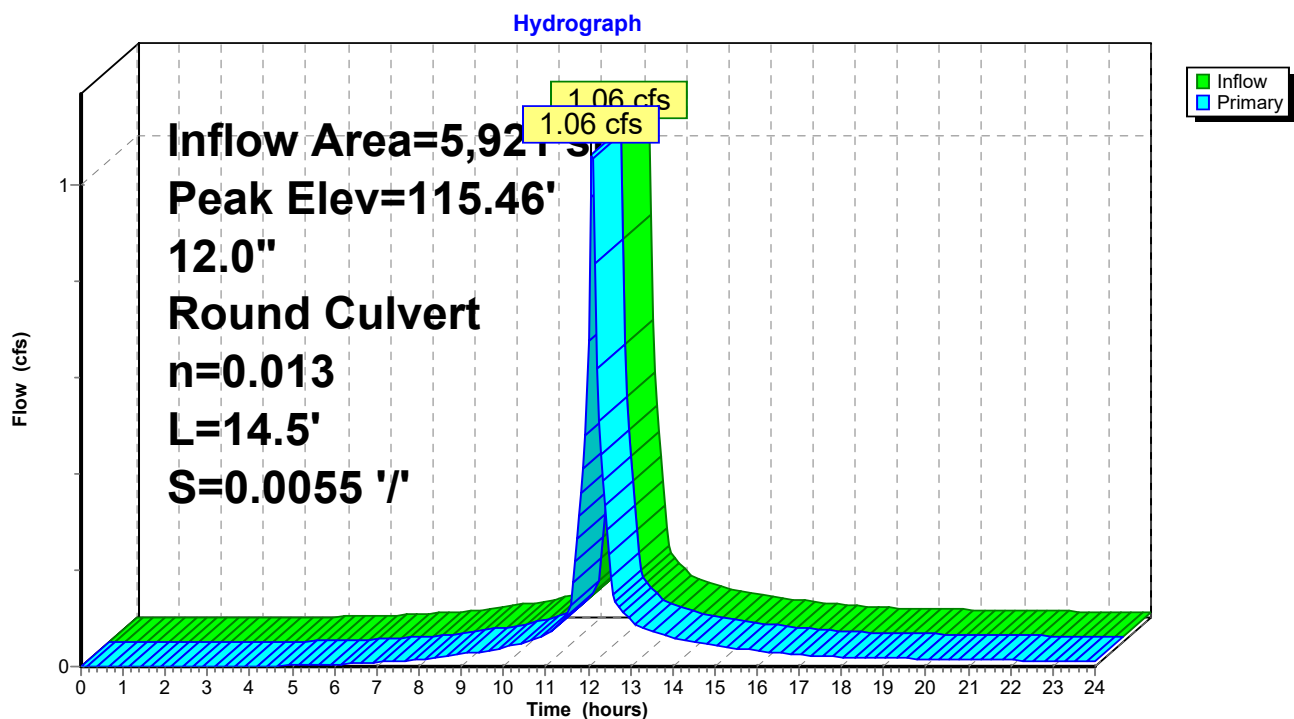
Flood Elev= 117.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.78'	12.0" Round Culvert L= 14.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.78' / 114.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.04 cfs @ 12.09 hrs HW=115.45' (Free Discharge)

↑**1=Culvert** (Barrel Controls 1.04 cfs @ 2.61 fps)

Pond 5P: CB4



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Stage-Area-Storage for Pond 5P: CB4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.78	0	115.84	0	116.90	0
114.80	0	115.86	0	116.92	0
114.82	0	115.88	0	116.94	0
114.84	0	115.90	0	116.96	0
114.86	0	115.92	0	116.98	0
114.88	0	115.94	0	117.00	0
114.90	0	115.96	0	117.02	0
114.92	0	115.98	0	117.04	0
114.94	0	116.00	0	117.06	0
114.96	0	116.02	0	117.08	0
114.98	0	116.04	0	117.10	0
115.00	0	116.06	0	117.12	0
115.02	0	116.08	0	117.14	0
115.04	0	116.10	0	117.16	0
115.06	0	116.12	0	117.18	0
115.08	0	116.14	0	117.20	0
115.10	0	116.16	0	117.22	0
115.12	0	116.18	0	117.24	0
115.14	0	116.20	0	117.26	0
115.16	0	116.22	0	117.28	0
115.18	0	116.24	0	117.30	0
115.20	0	116.26	0	117.32	0
115.22	0	116.28	0	117.34	0
115.24	0	116.30	0	117.36	0
115.26	0	116.32	0	117.38	0
115.28	0	116.34	0	117.40	0
115.30	0	116.36	0		
115.32	0	116.38	0		
115.34	0	116.40	0		
115.36	0	116.42	0		
115.38	0	116.44	0		
115.40	0	116.46	0		
115.42	0	116.48	0		
115.44	0	116.50	0		
115.46	0	116.52	0		
115.48	0	116.54	0		
115.50	0	116.56	0		
115.52	0	116.58	0		
115.54	0	116.60	0		
115.56	0	116.62	0		
115.58	0	116.64	0		
115.60	0	116.66	0		
115.62	0	116.68	0		
115.64	0	116.70	0		
115.66	0	116.72	0		
115.68	0	116.74	0		
115.70	0	116.76	0		
115.72	0	116.78	0		
115.74	0	116.80	0		
115.76	0	116.82	0		
115.78	0	116.84	0		
115.80	0	116.86	0		
115.82	0	116.88	0		

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Type III 24-hr 100-Year Rainfall=8.94"

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Summary for Pond 6P: CDS2

[81] Warning: Exceeded Pond 3P by 0.23' @ 12.10 hrs

[79] Warning: Submerged Pond 5P Primary device # 1 INLET by 0.68'

Inflow Area = 7,931 sf, 79.50% Impervious, Inflow Depth > 7.27" for 100-Year event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 4,807 cf
Outflow = 1.44 cfs @ 12.09 hrs, Volume= 4,807 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.44 cfs @ 12.09 hrs, Volume= 4,807 cf
Routed to Pond 2P : SUBSURFACE INFILTRATION #2

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

Peak Elev= 115.47' @ 12.09 hrs

Flood Elev= 118.00'

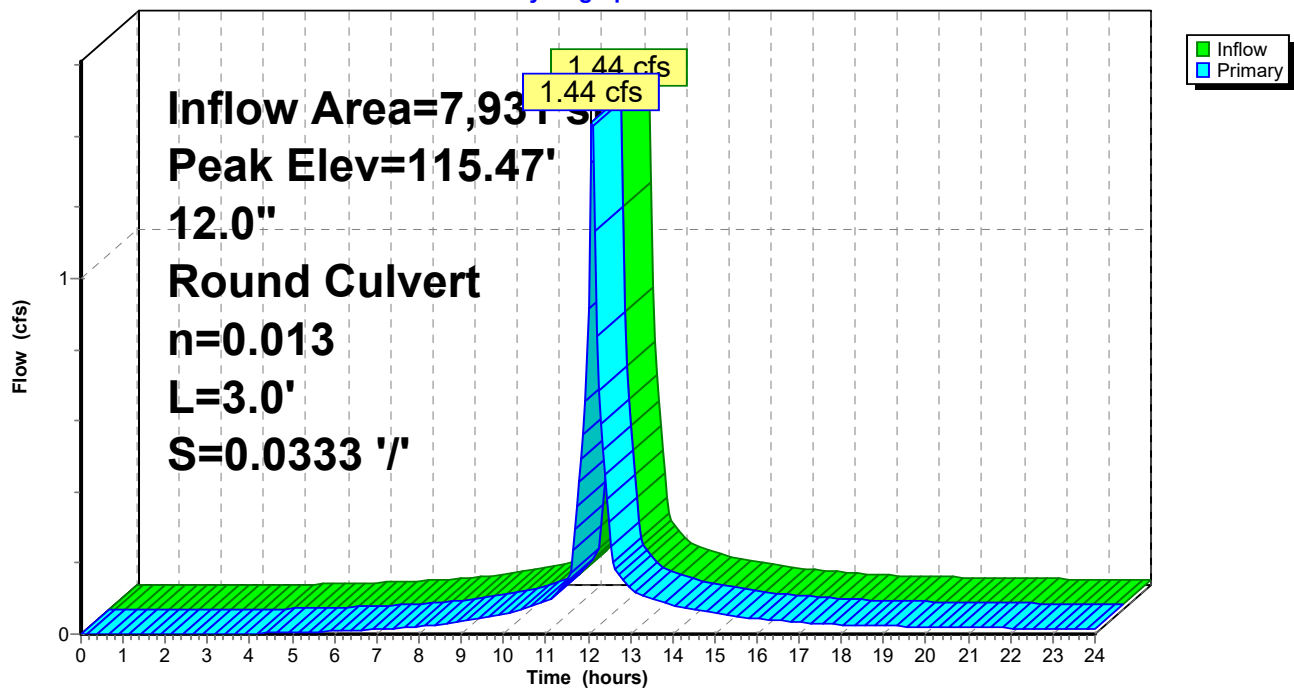
Device	Routing	Invert	Outlet Devices
#1	Primary	114.70'	12.0" Round Culvert L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 114.70' / 114.60' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.09 hrs HW=115.46' (Free Discharge)

↑**1=Culvert** (Barrel Controls 1.40 cfs @ 3.06 fps)

Pond 6P: CDS2

Hydrograph



POST

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Stage-Area-Storage for Pond 6P: CDS2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
114.70	0	117.35	0
114.75	0	117.40	0
114.80	0	117.45	0
114.85	0	117.50	0
114.90	0	117.55	0
114.95	0	117.60	0
115.00	0	117.65	0
115.05	0	117.70	0
115.10	0	117.75	0
115.15	0	117.80	0
115.20	0	117.85	0
115.25	0	117.90	0
115.30	0	117.95	0
115.35	0	118.00	0
115.40	0		
115.45	0		
115.50	0		
115.55	0		
115.60	0		
115.65	0		
115.70	0		
115.75	0		
115.80	0		
115.85	0		
115.90	0		
115.95	0		
116.00	0		
116.05	0		
116.10	0		
116.15	0		
116.20	0		
116.25	0		
116.30	0		
116.35	0		
116.40	0		
116.45	0		
116.50	0		
116.55	0		
116.60	0		
116.65	0		
116.70	0		
116.75	0		
116.80	0		
116.85	0		
116.90	0		
116.95	0		
117.00	0		
117.05	0		
117.10	0		
117.15	0		
117.20	0		
117.25	0		
117.30	0		

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Summary for Pond 7P: CB2

Inflow Area = 1,227 sf, 100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 889 cf
Outflow = 0.24 cfs @ 12.09 hrs, Volume= 889 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.24 cfs @ 12.09 hrs, Volume= 889 cf
Routed to Pond 8P : DMH1

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

Peak Elev= 119.46' @ 12.09 hrs

Flood Elev= 122.15'

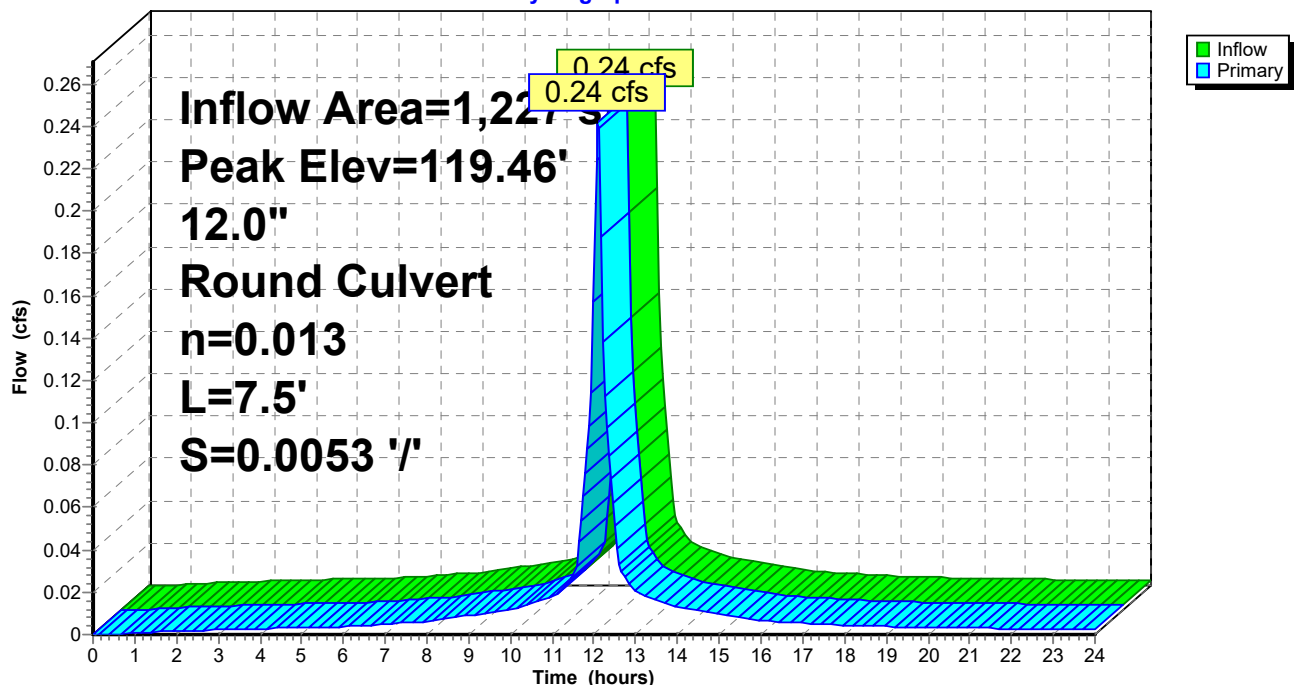
Device	Routing	Invert	Outlet Devices
#1	Primary	119.15'	12.0" Round Culvert L= 7.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.15' / 119.11' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.23 cfs @ 12.09 hrs HW=119.45' (Free Discharge)

↑1=Culvert (Barrel Controls 0.23 cfs @ 1.75 fps)

Pond 7P: CB2

Hydrograph



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Stage-Area-Storage for Pond 7P: CB2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.15	0	120.21	0	121.27	0
119.17	0	120.23	0	121.29	0
119.19	0	120.25	0	121.31	0
119.21	0	120.27	0	121.33	0
119.23	0	120.29	0	121.35	0
119.25	0	120.31	0	121.37	0
119.27	0	120.33	0	121.39	0
119.29	0	120.35	0	121.41	0
119.31	0	120.37	0	121.43	0
119.33	0	120.39	0	121.45	0
119.35	0	120.41	0	121.47	0
119.37	0	120.43	0	121.49	0
119.39	0	120.45	0	121.51	0
119.41	0	120.47	0	121.53	0
119.43	0	120.49	0	121.55	0
119.45	0	120.51	0	121.57	0
119.47	0	120.53	0	121.59	0
119.49	0	120.55	0	121.61	0
119.51	0	120.57	0	121.63	0
119.53	0	120.59	0	121.65	0
119.55	0	120.61	0	121.67	0
119.57	0	120.63	0	121.69	0
119.59	0	120.65	0	121.71	0
119.61	0	120.67	0	121.73	0
119.63	0	120.69	0	121.75	0
119.65	0	120.71	0	121.77	0
119.67	0	120.73	0	121.79	0
119.69	0	120.75	0	121.81	0
119.71	0	120.77	0	121.83	0
119.73	0	120.79	0	121.85	0
119.75	0	120.81	0	121.87	0
119.77	0	120.83	0	121.89	0
119.79	0	120.85	0	121.91	0
119.81	0	120.87	0	121.93	0
119.83	0	120.89	0	121.95	0
119.85	0	120.91	0	121.97	0
119.87	0	120.93	0	121.99	0
119.89	0	120.95	0	122.01	0
119.91	0	120.97	0	122.03	0
119.93	0	120.99	0	122.05	0
119.95	0	121.01	0	122.07	0
119.97	0	121.03	0	122.09	0
119.99	0	121.05	0	122.11	0
120.01	0	121.07	0	122.13	0
120.03	0	121.09	0	122.15	0
120.05	0	121.11	0		
120.07	0	121.13	0		
120.09	0	121.15	0		
120.11	0	121.17	0		
120.13	0	121.19	0		
120.15	0	121.21	0		
120.17	0	121.23	0		
120.19	0	121.25	0		

POST

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Summary for Pond 8P: DMH1

[81] Warning: Exceeded Pond 1P by 0.01' @ 12.10 hrs

[79] Warning: Submerged Pond 7P Primary device # 1 INLET by 0.24'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf
Outflow = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf
Routed to Pond 10P : CDS1

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

Peak Elev= 119.39' @ 12.09 hrs

Flood Elev= 122.50'

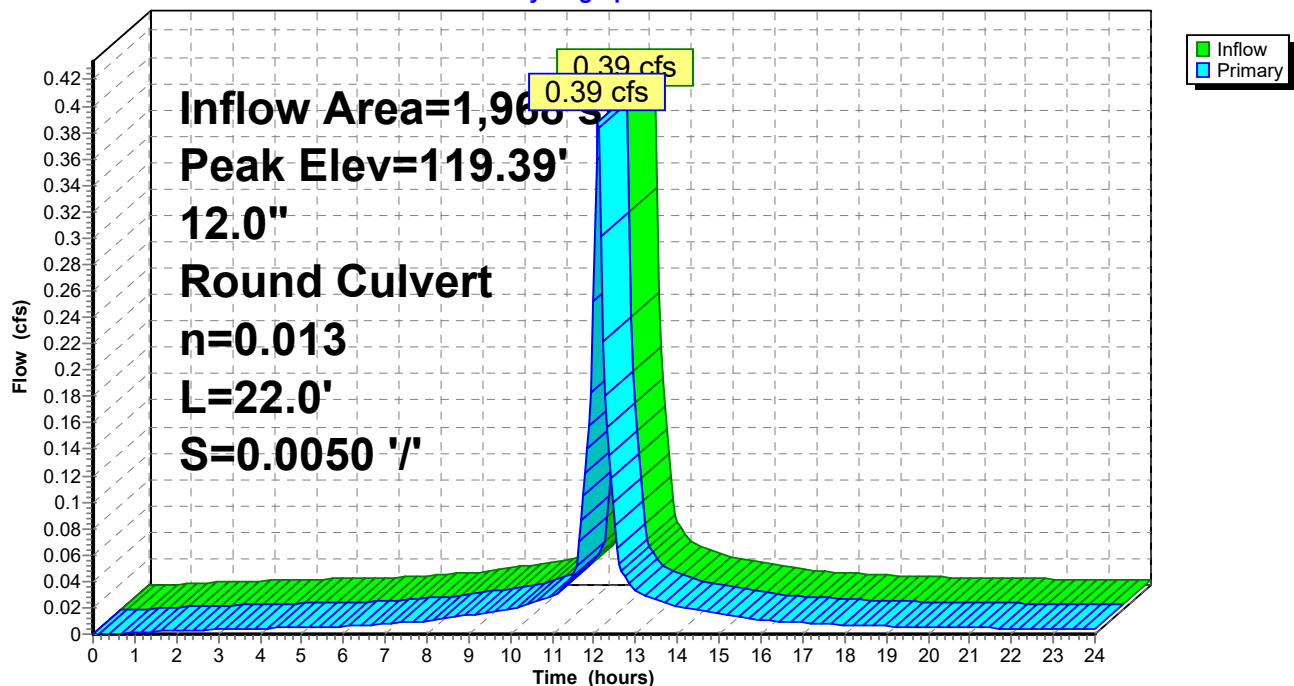
Device	Routing	Invert	Outlet Devices
#1	Primary	119.01'	12.0" Round Culvert L= 22.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.01' / 118.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.09 hrs HW=119.39' (Free Discharge)

↑1=Culvert (Barrel Controls 0.38 cfs @ 2.05 fps)

Pond 8P: DMH1

Hydrograph



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Stage-Area-Storage for Pond 8P: DMH1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
119.01	0	121.66	0
119.06	0	121.71	0
119.11	0	121.76	0
119.16	0	121.81	0
119.21	0	121.86	0
119.26	0	121.91	0
119.31	0	121.96	0
119.36	0	122.01	0
119.41	0	122.06	0
119.46	0	122.11	0
119.51	0	122.16	0
119.56	0	122.21	0
119.61	0	122.26	0
119.66	0	122.31	0
119.71	0	122.36	0
119.76	0	122.41	0
119.81	0	122.46	0
119.86	0		
119.91	0		
119.96	0		
120.01	0		
120.06	0		
120.11	0		
120.16	0		
120.21	0		
120.26	0		
120.31	0		
120.36	0		
120.41	0		
120.46	0		
120.51	0		
120.56	0		
120.61	0		
120.66	0		
120.71	0		
120.76	0		
120.81	0		
120.86	0		
120.91	0		
120.96	0		
121.01	0		
121.06	0		
121.11	0		
121.16	0		
121.21	0		
121.26	0		
121.31	0		
121.36	0		
121.41	0		
121.46	0		
121.51	0		
121.56	0		
121.61	0		

POST

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Summary for Pond 9P: SUBSURFACE INFILTRATION #3

Inflow Area = 3,048 sf, 100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
 Inflow = 0.60 cfs @ 12.09 hrs, Volume= 2,208 cf
 Outflow = 0.06 cfs @ 12.79 hrs, Volume= 2,207 cf, Atten= 89%, Lag= 42.1 min
 Discarded = 0.06 cfs @ 12.79 hrs, Volume= 2,207 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 117.02' @ 12.79 hrs Surf.Area= 506 sf Storage= 831 cf

Plug-Flow detention time= 113.5 min calculated for 2,202 cf (100% of inflow)
 Center-of-Mass det. time= 112.8 min (852.3 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	114.50'	481 cf	15.75'W x 32.10'L x 3.50'H Field A 1,769 cf Overall - 567 cf Embedded = 1,202 cf x 40.0% Voids
#2A	115.00'	567 cf	ADS_StormTech SC-740 b +Cap x 12 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 3 Rows Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf
		1,048 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 112.50'

Discarded OutFlow Max=0.06 cfs @ 12.79 hrs HW=117.02' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.06 cfs)

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Pond 9P: SUBSURFACE INFILTRATION #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 3 rows = 15.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length

3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

12 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 3 Rows = 567.2 cf Chamber Storage

1,769.3 cf Field - 567.2 cf Chambers = 1,202.1 cf Stone x 40.0% Voids = 480.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,048.1 cf = 0.024 af

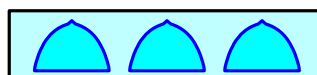
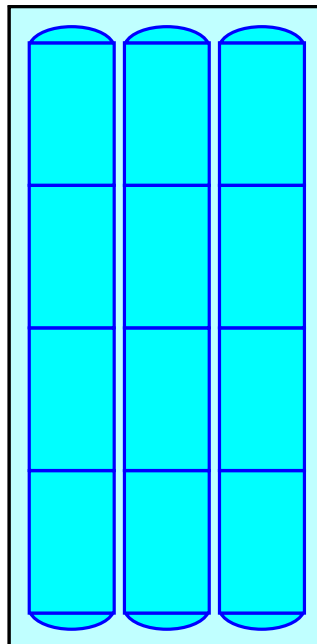
Overall Storage Efficiency = 59.2%

Overall System Size = 32.10' x 15.75' x 3.50'

12 Chambers

65.5 cy Field

44.5 cy Stone



POST

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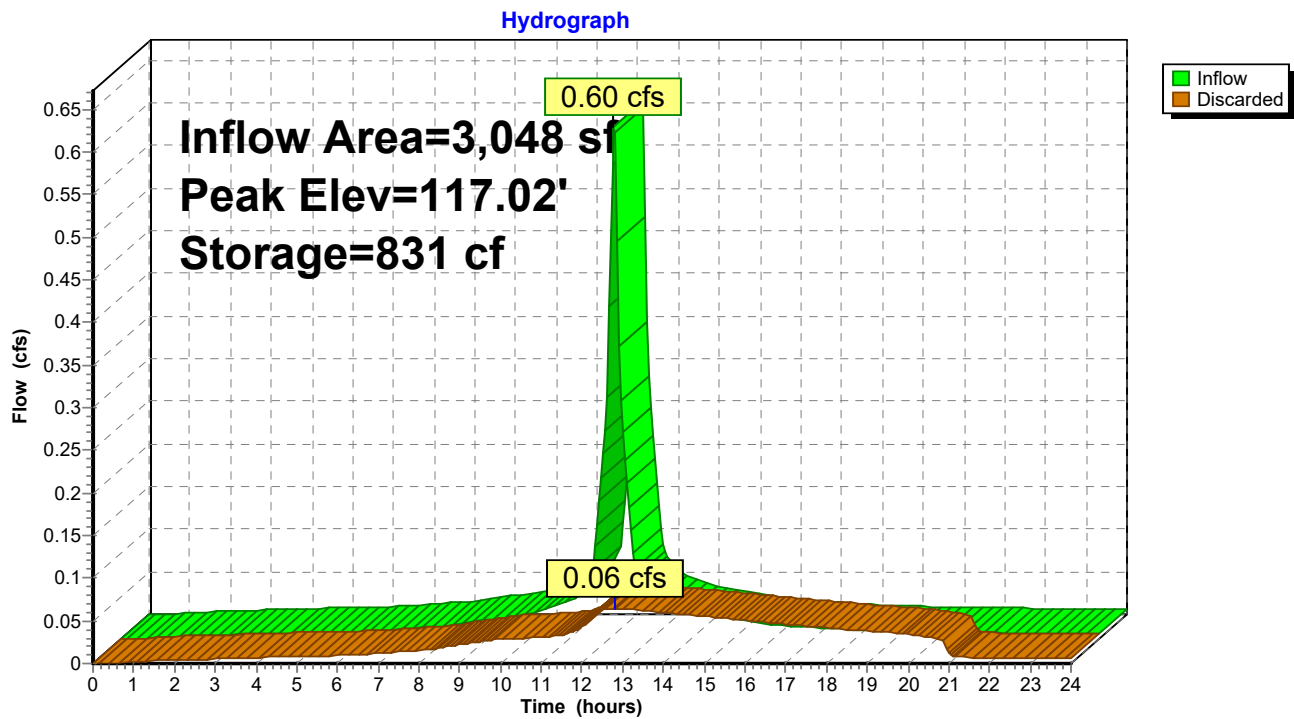
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Pond 9P: SUBSURFACE INFILTRATION #3



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Stage-Area-Storage for Pond 9P: SUBSURFACE INFILTRATION #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.50	506	0	117.15	506	867
114.55	506	10	117.20	506	880
114.60	506	20	117.25	506	892
114.65	506	30	117.30	506	904
114.70	506	40	117.35	506	915
114.75	506	51	117.40	506	926
114.80	506	61	117.45	506	937
114.85	506	71	117.50	506	947
114.90	506	81	117.55	506	957
114.95	506	91	117.60	506	967
115.00	506	101	117.65	506	977
115.05	506	121	117.70	506	987
115.10	506	141	117.75	506	998
115.15	506	161	117.80	506	1,008
115.20	506	181	117.85	506	1,018
115.25	506	200	117.90	506	1,028
115.30	506	220	117.95	506	1,038
115.35	506	240	118.00	506	1,048
115.40	506	259			
115.45	506	279			
115.50	506	298			
115.55	506	318			
115.60	506	337			
115.65	506	356			
115.70	506	375			
115.75	506	394			
115.80	506	413			
115.85	506	432			
115.90	506	451			
115.95	506	469			
116.00	506	488			
116.05	506	506			
116.10	506	524			
116.15	506	543			
116.20	506	561			
116.25	506	578			
116.30	506	596			
116.35	506	614			
116.40	506	631			
116.45	506	648			
116.50	506	665			
116.55	506	682			
116.60	506	699			
116.65	506	716			
116.70	506	732			
116.75	506	748			
116.80	506	764			
116.85	506	779			
116.90	506	795			
116.95	506	810			
117.00	506	825			
117.05	506	839			
117.10	506	853			

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Summary for Pond 10P: CDS1

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.16'

Inflow Area = 1,968 sf, 100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf
Outflow = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 12.09 hrs, Volume= 1,426 cf
Routed to Pond 4P : SUBSURFACE INFILTRATION #1

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

Peak Elev= 119.17' @ 12.09 hrs

Flood Elev= 122.50'

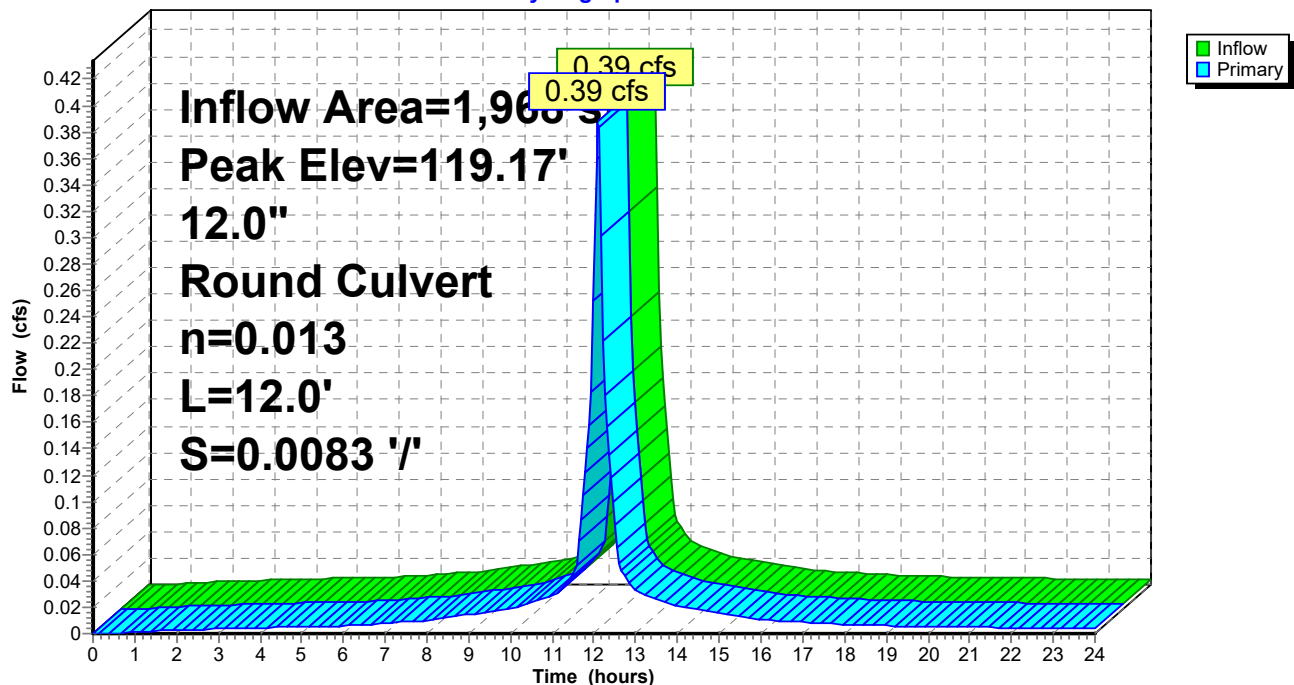
Device	Routing	Invert	Outlet Devices
#1	Primary	118.80'	12.0" Round Culvert L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.80' / 118.70' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.09 hrs HW=119.16' (Free Discharge)

←1=Culvert (Barrel Controls 0.38 cfs @ 2.18 fps)

Pond 10P: CDS1

Hydrograph



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Stage-Area-Storage for Pond 10P: CDS1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
118.80	0	121.45	0
118.85	0	121.50	0
118.90	0	121.55	0
118.95	0	121.60	0
119.00	0	121.65	0
119.05	0	121.70	0
119.10	0	121.75	0
119.15	0	121.80	0
119.20	0	121.85	0
119.25	0	121.90	0
119.30	0	121.95	0
119.35	0	122.00	0
119.40	0	122.05	0
119.45	0	122.10	0
119.50	0	122.15	0
119.55	0	122.20	0
119.60	0	122.25	0
119.65	0	122.30	0
119.70	0	122.35	0
119.75	0	122.40	0
119.80	0	122.45	0
119.85	0	122.50	0
119.90	0		
119.95	0		
120.00	0		
120.05	0		
120.10	0		
120.15	0		
120.20	0		
120.25	0		
120.30	0		
120.35	0		
120.40	0		
120.45	0		
120.50	0		
120.55	0		
120.60	0		
120.65	0		
120.70	0		
120.75	0		
120.80	0		
120.85	0		
120.90	0		
120.95	0		
121.00	0		
121.05	0		
121.10	0		
121.15	0		
121.20	0		
121.25	0		
121.30	0		
121.35	0		
121.40	0		

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Summary for Link DP1: link

Inflow Area = 4,532 sf, 12.29% Impervious, Inflow Depth > 2.37" for 100-Year event

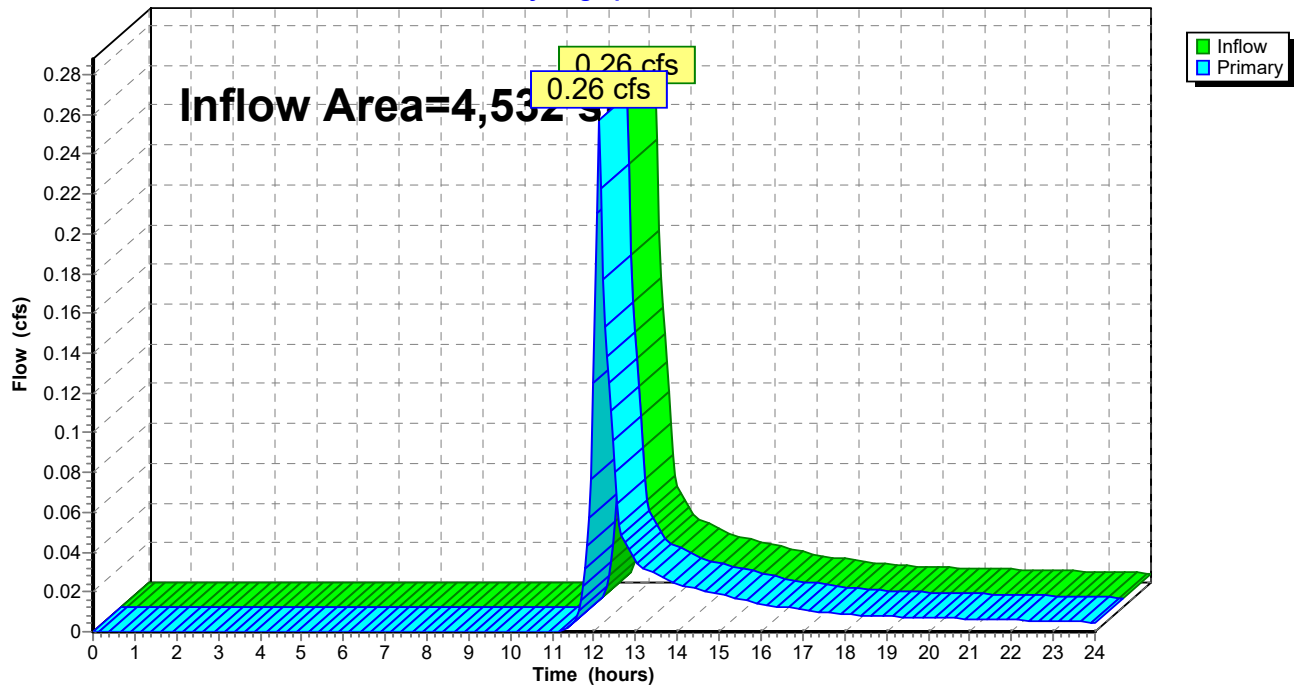
Inflow = 0.26 cfs @ 12.10 hrs, Volume= 894 cf

Primary = 0.26 cfs @ 12.10 hrs, Volume= 894 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP1: link

Hydrograph



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Summary for Link DP2: link

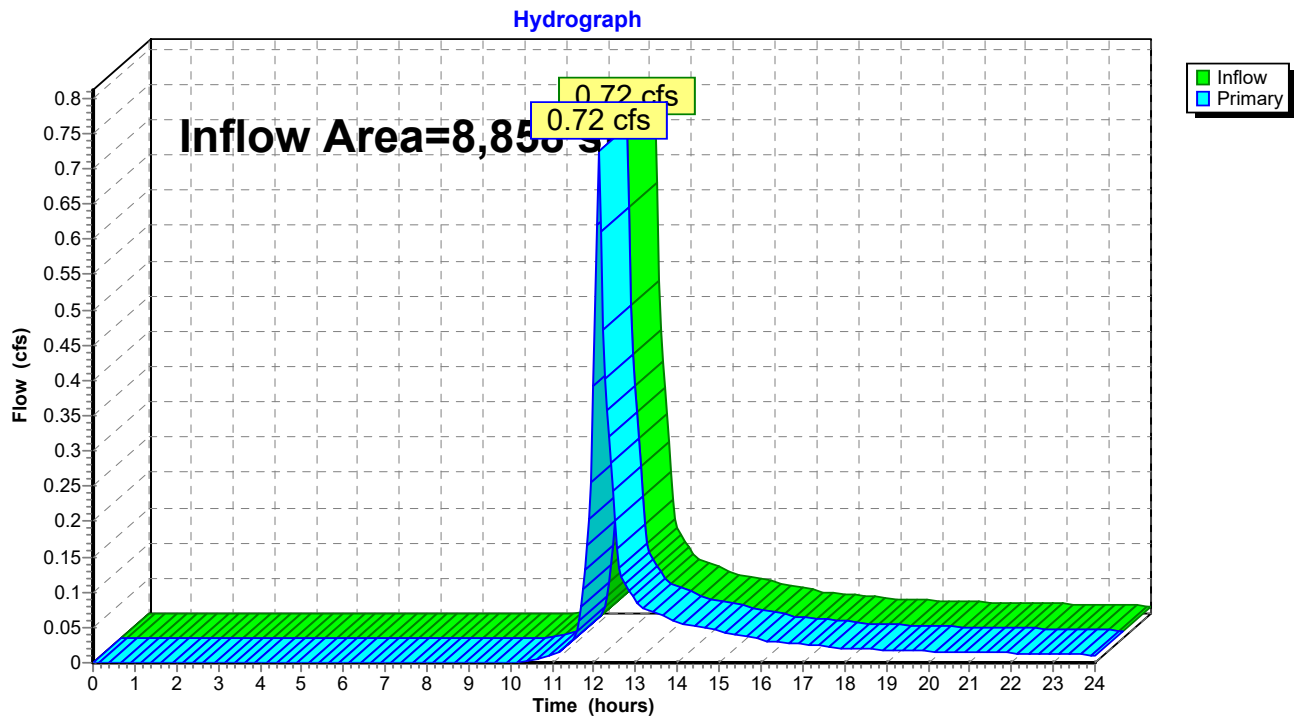
Inflow Area = 8,858 sf, 24.43% Impervious, Inflow Depth > 3.20" for 100-Year event

Inflow = 0.72 cfs @ 12.10 hrs, Volume= 2,362 cf

Primary = 0.72 cfs @ 12.10 hrs, Volume= 2,362 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP2: link



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Summary for Link DP3: link

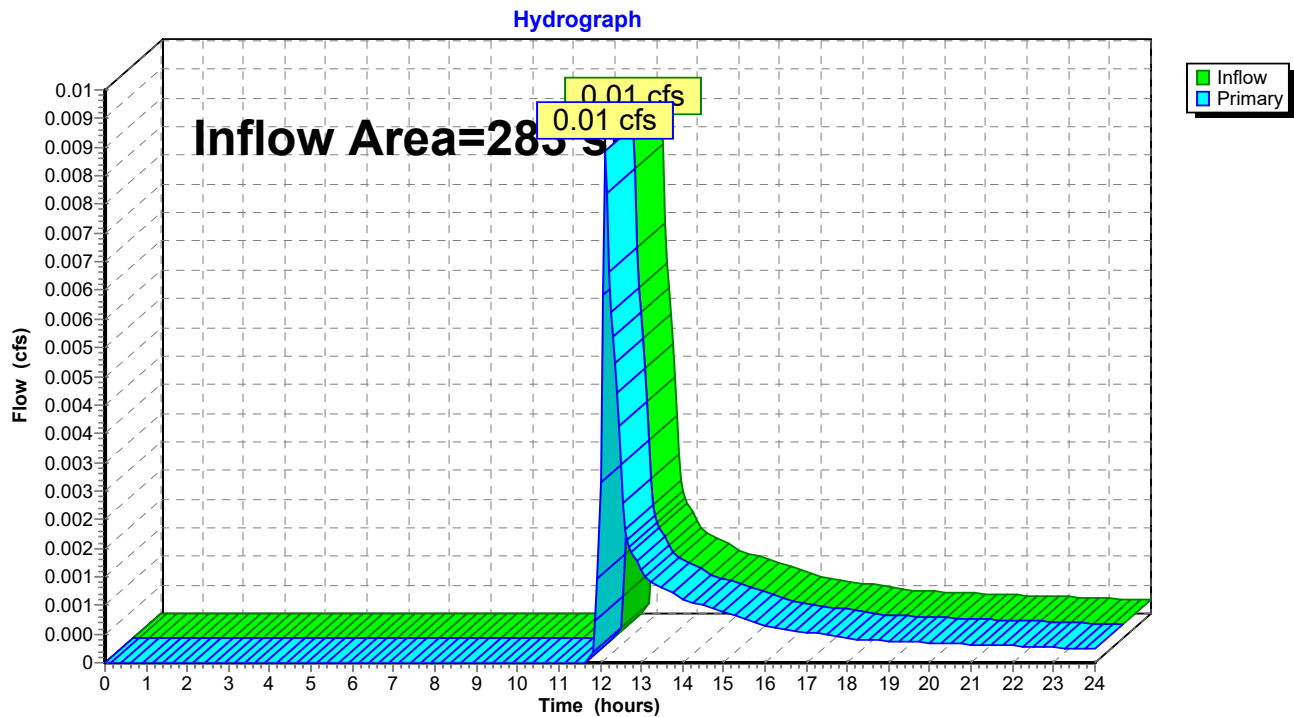
Inflow Area = 283 sf, 0.00% Impervious, Inflow Depth > 1.57" for 100-Year event

Inflow = 0.01 cfs @ 12.11 hrs, Volume= 37 cf

Primary = 0.01 cfs @ 12.11 hrs, Volume= 37 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP3: link



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Summary for Link DP4: link

Inflow Area = 532 sf, 0.00% Impervious, Inflow Depth > 1.57" for 100-Year event

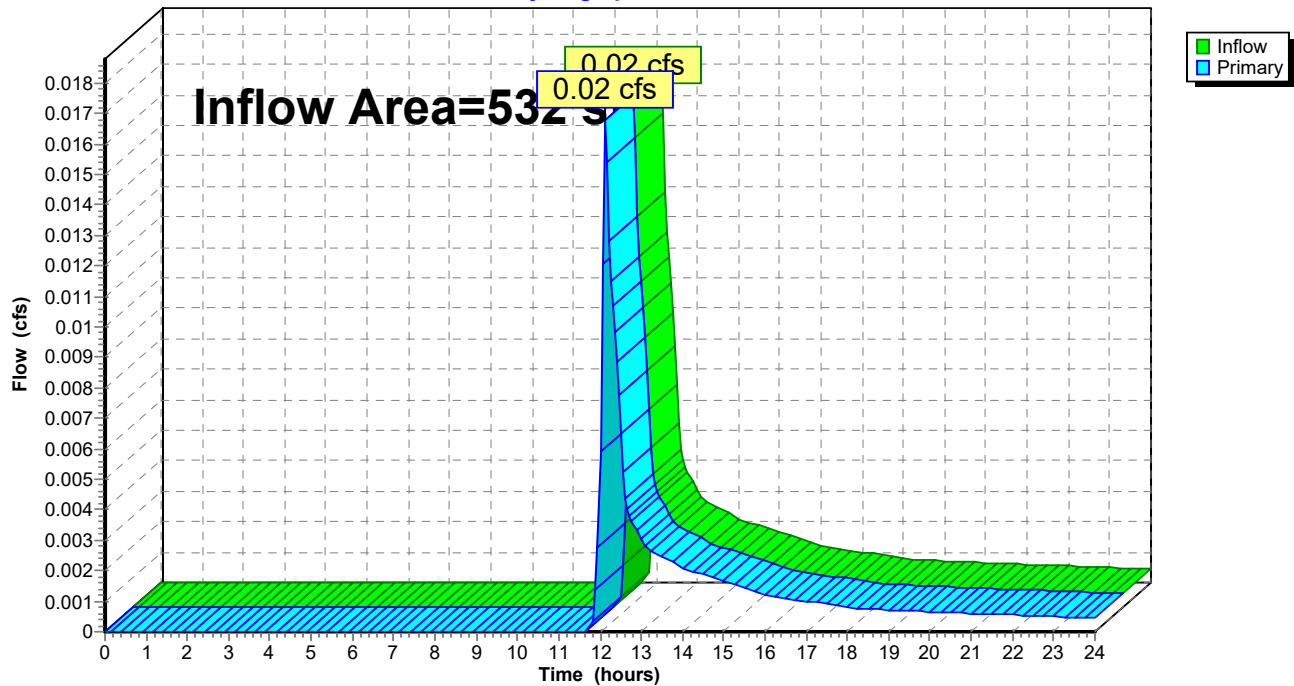
Inflow = 0.02 cfs @ 12.11 hrs, Volume= 70 cf

Primary = 0.02 cfs @ 12.11 hrs, Volume= 70 cf, Atten= 0%, Lag= 0.0 min

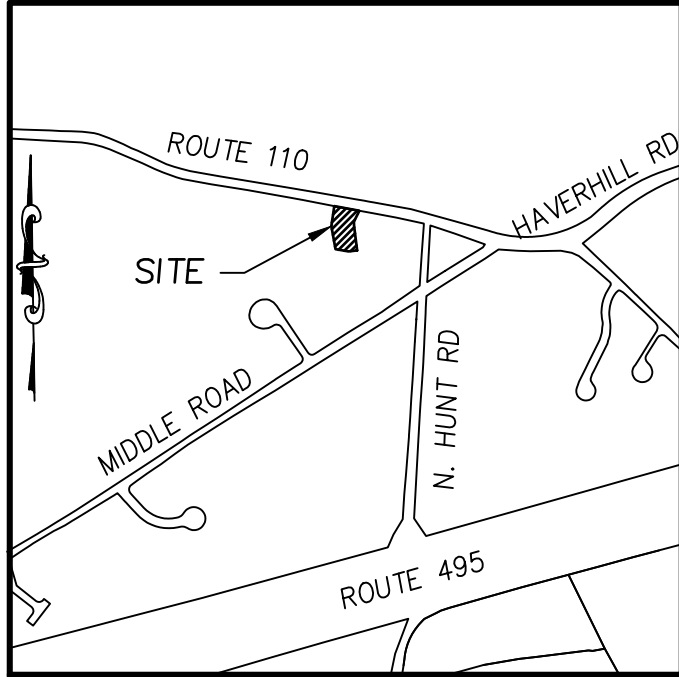
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP4: link

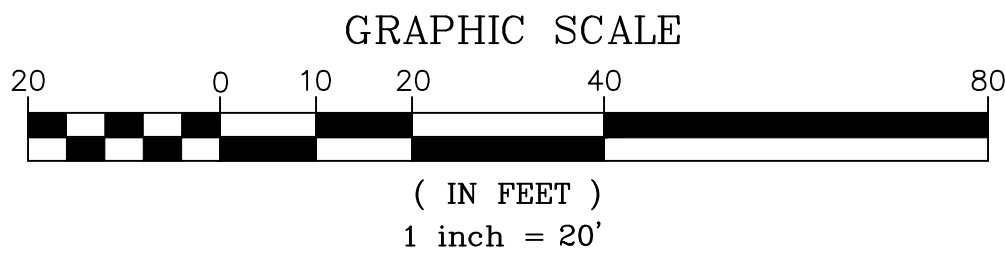
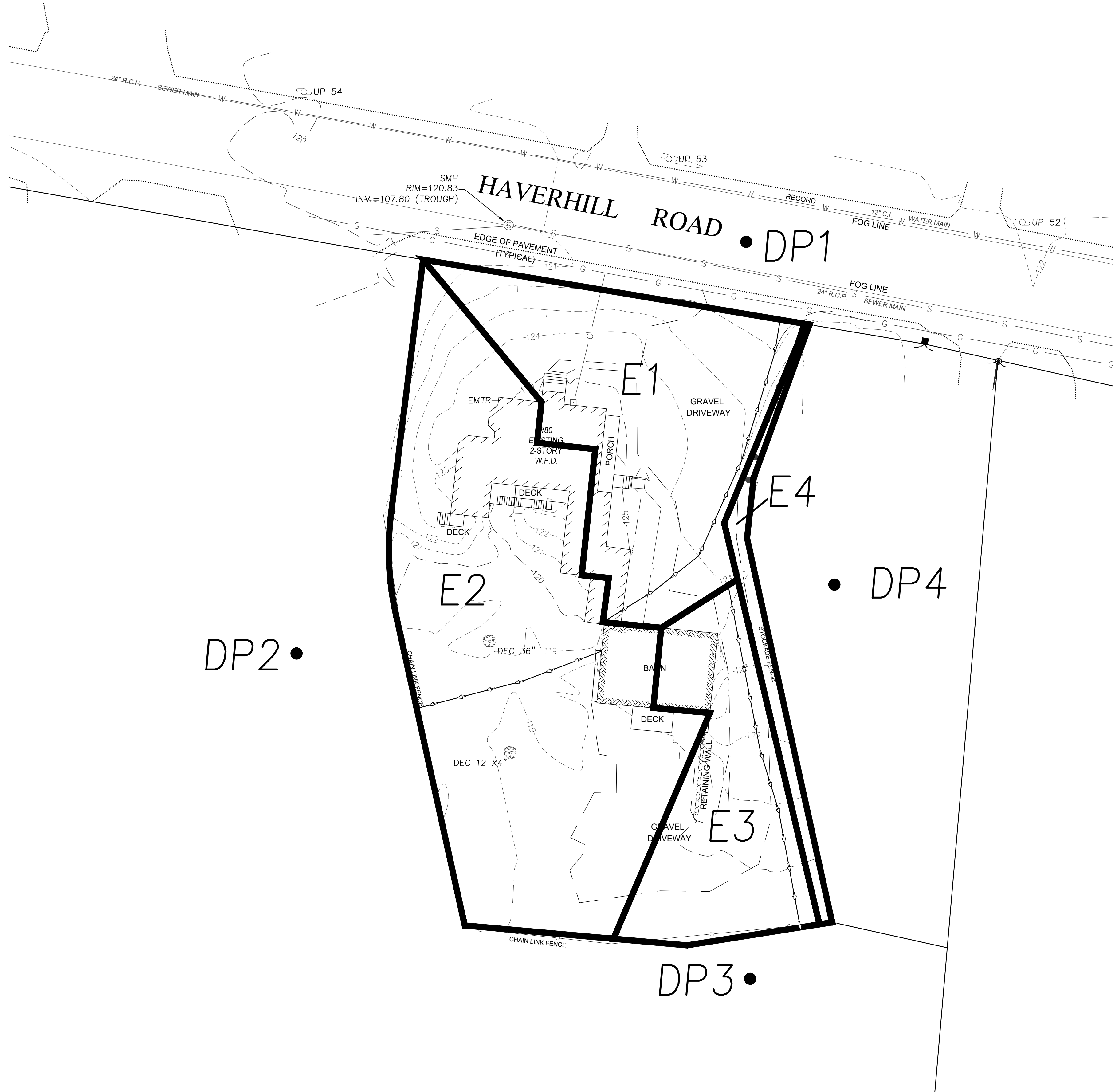
Hydrograph



d. Watershed Maps



LOCUS MAP
1"=1000'



PREPARED FOR
80 HAVERHILL ROAD, LLC
80 HAVERHILL ROAD
AMESBURY, MA

NO.	DATE	DESCRIPTION	BY
1	1/21/25	RESPONSE TO PEER REVIEW	S.R.C.

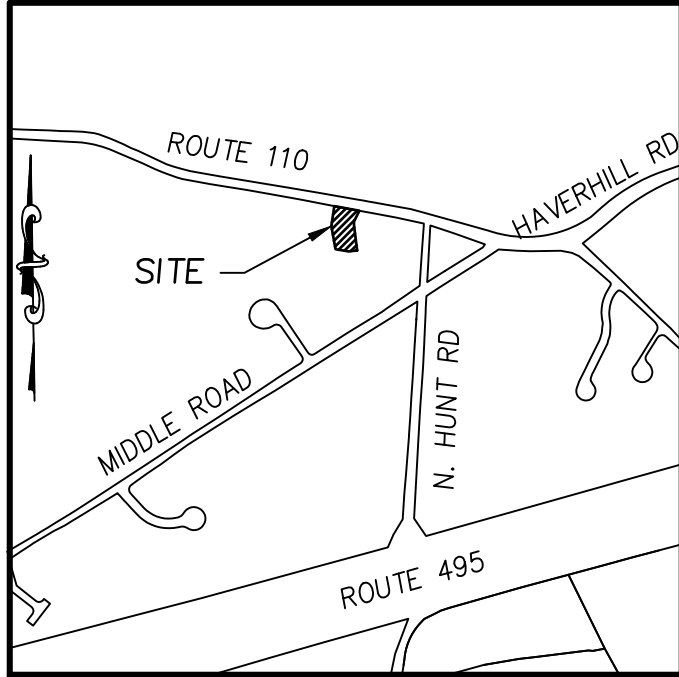


MILLENNIUM ENGINEERING, INC.
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62 ELM ST. SALISBURY, MA 01952 (978) 463-8980
13 HAMPTON RD. EXETER, NH 03833 (603) 778-0528

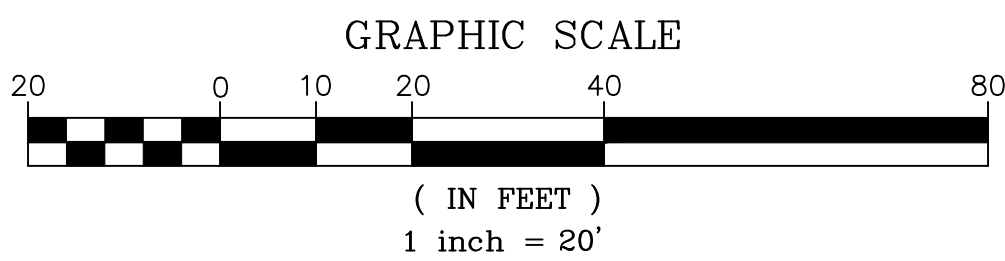
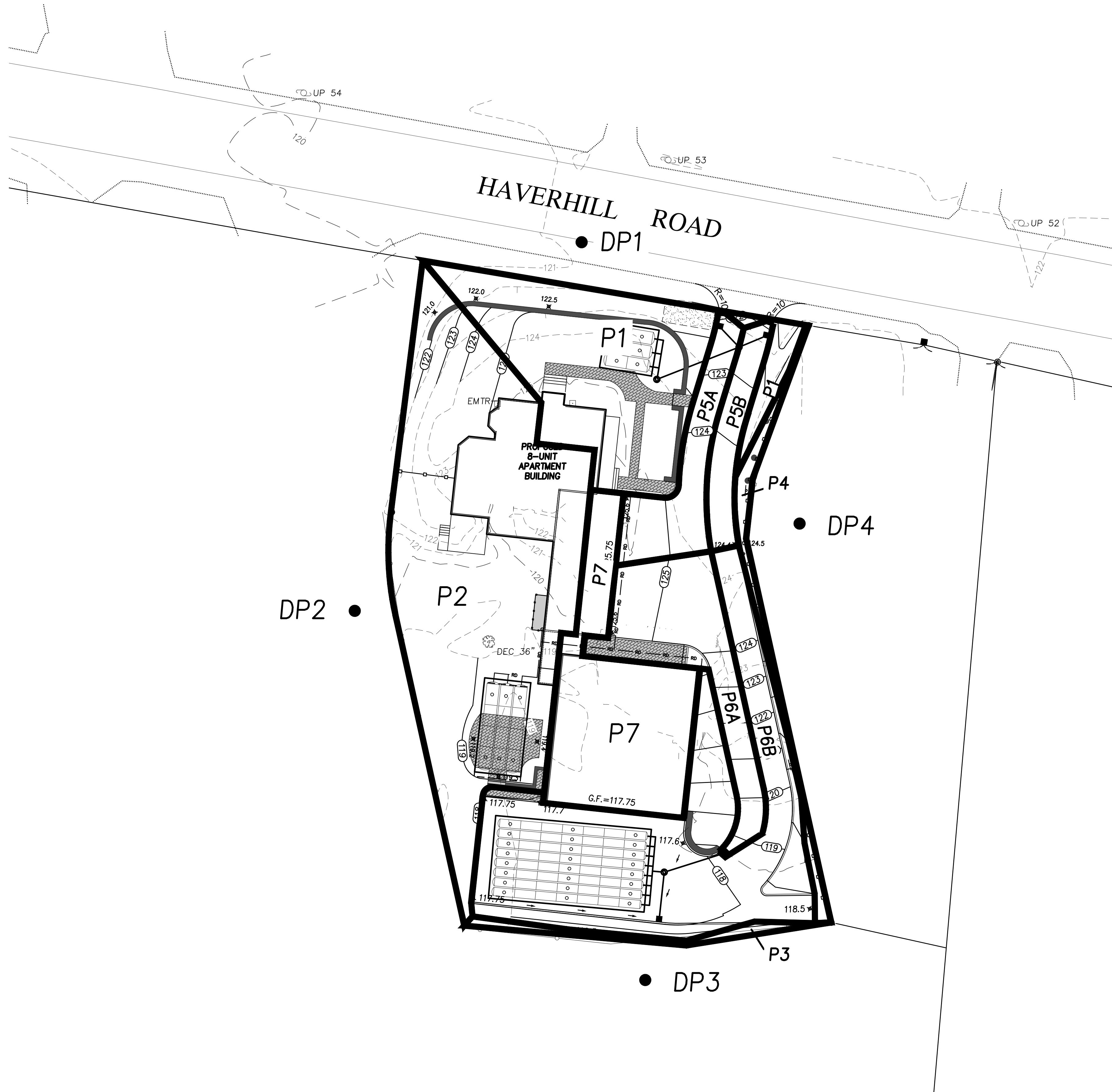
SCALE: 1"=20'	CALC. BY: S.R.C.	PROJECT: M234276
DATE: NOV. 8, 2024	CHKD. BY: E.W.B.	

SITE PLAN
IN
AMESBURY, MA
AT
80 HAVERHILL ROAD

**PRE-
DEVELOPMENT
WATERSHED
MAP**



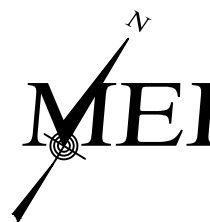
LOCUS MAP
1"=1000'



PREPARED FOR

80 HAVERHILL ROAD, LLC
80 HAVERHILL ROAD
AMESBURY, MA

NO.	DATE	DESCRIPTION	BY
1	1/21/25	RESPONSE TO PEER REVIEW	S.R.C.



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DATE: NOV. 8, 2024	CHKD. BY: E.W.B.	

SITE PLAN
IN
AMESBURY, MA
AT
80 HAVERHILL ROAD

**POST-
DEVELOPMENT
WATERSHED
MAP**