ARLINGTON HIGH SCHOOL
869 MASSACHUSETTS AVENUE
Arlington, MA 02476

STORMWATER REPORT

Submitted to:
Town of Arlington Conservation Commission,
Massachusetts Department of Environmental Protection

Applicant:
Town of Arlington
730 Massachusetts Avenue
Arlington, MA 02476

Architect:
HMFH Architects, Inc.
130 Bishop Allen Dr.
Cambridge, MA 02139

Landscape Architect:
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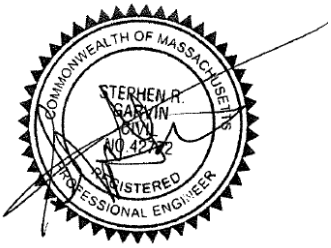
67 Batterymarch St., 2nd Floor
Boston, MA 02110

Civil Engineer/Land Surveyor:
Samiotes Consultants, Inc.
20 A Street
Framingham, MA 01701



samiotes

07 May 2020

ARLINGTON HIGH SCHOOL
STORMWATER MANAGEMENT NARRATIVE
ARLINGTON, MA

Introduction:

The existing site, located at 869 Massachusetts Avenue, Arlington, MA, consists of the Arlington High School campus, containing the existing Arlington High School Building with an associated paved driveways, landscaped areas, and utilities as well as grass athletic fields, a turf football field, and facilities. There are several accessory structures across the property for equipment storage and bathroom facilities for the fields. The property is abutted by the Minuteman Commuter Bikeway on the north side, a condominum complex, church, and pharmacy on the east side, and a series of residences and the Francis N. O'Hara building on the west side. The site slopes approximately 35 feet from south to north, with the high point of the site being at Massachusetts Ave. and the low point being on the east side of the site at the end of the Mill Brook culvert. Mill Brook flows through the site from west to east between the existing building and the football stadium via a subsurface concrete box culvert. which splits into two corrugated metal culverts on the east side of the existing building before daylighting on the east side of the site adjacent to Mill Street Extension.

The proposed project includes a new 143,025 square foot High School building footprint with associated new paved parking areas, landscaping, athletic fields, bathroom building, utilities and a new stormwater management system in accordance with the Massachusettss DEP Stormwater Standards. The existing football stadium will remain as is and is not within the scope of this project.

Existing Site Hydrology:

In the existing condition, site drainage is handled by a series of "daisy-chained" catch basins that capture stormwater flows and conveys it via underground stormwater piping to the Mill Brook culvert. There is also a large existing culvert, consisting of a 36" reinforced concrete pipe (RCP), that flows under the existing building and discharges to the Mill Brook culvert. This 36" culvert carries a large upgradient offsite watershed from South of the project site that measures over 4,500,000 sf (105+ Ac). See figure within the appendices of this report. Historically this culvert has been shown to be undersized and has caused flooding and floor buckling within the basement of the High School.

From a stormwater treatment perspective, there is an existing oil/water separator unit on the north side of the building, however this structure only treats a single catchment area of a much larger impervious area on-site. The field areas and football stadium have underdrainage system that ties into the Mill Brook culvert as well.

According to FEMA flood mapping, the site is located within Zones X and AE (see FEMA Firmette Map within the appendices of this report). These flood zones are depicted graphically on the civil design plans and existing conditions plans per the FEMA delineation. However, after a field survey of elevations present at the site, we have concluded that the flood elevations shown on the FEMA mapping are held within the banks of the Mill Brook and do not encroach on the site. During the last major renovation at the school, there was a small area on the east side of the school dedicated for compensatory storage.

Methodology/ Procedure

The proposed Stormwater Management system will include several stormwater Best Management Practices (BMPs) consisting of deep sump catch basins, water quality treatment units, an underground

infiltration system, and three (3) lined rain gardens used for filtration. See the Proposed Watersheds section within this report for detailed information about the proposed BMPs for each watershed included in the stormwater management design.

Watershed Routing

Below is a summary of the various existing and proposed watersheds with a brief narrative describing the routing. The watersheds are depicted in sketches Ex-HYD and P-HYD located in the appendices of this report. The hydrology maps show a single point of analysis (POA) in both the existing conditions and the proposed conditions. POA-1 represents the culmination point of stormwater flows across the site within Mill Brook on the east side of the site.

Existing Watersheds:

Ex- Watershed-1: This watershed consists of the existing high school building, fields, paved parking areas and landscaped areas across the site. Stormwater from this watershed sheet flows overland to existing catch basins across the site, which are conveyed via existing underground piping to the existing drainage systems on the north side of the site before discharging to Mill Brook, defined as POA-1.

Proposed Watersheds:

P- Watershed-1: This watershed consists of paved parking areas, pedestrian walkways, and landscaped areas that sheet flow overland to the proposed deep sump catch basins, where it is then conveyed to a proposed water quality unit prior to discharging to the culertized portion of Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1).

P- Watershed-1A: This watershed consists of a portion of the paved parking area and landscaped area on the east side of the site. Stormwater sheet flows overland to proposed deep sump catch basins, where it is then conveyed to a proposed water quality unit prior to discharging to Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1).

P- Watershed-1B: This watershed consists of the northwest portion of the proposed building. Stormwater is collected and piped underground via roof drain piping to the culvertized portion of Mill Brook, defined as Point of Analysis 1 (POA-1).

P- Watershed-1C: This watershed consists of pedestrian walkways, landscaped areas, and wooded areas on the east edge of the site. Stormwater sheet flows that do not discharge directly to Mill Brook flow overland to the abutting property where they eventually culminate at Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1).

P- Watershed-1D: This watershed consists of the southern portion of the proposed building. Stormwater is collected and piped underground via roof drain piping to an existing drain pipe that discharges to Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1).

P- Watershed-1E: This watershed consists of pedestrian walkways and landscaped areas that sheet flow overland to the proposed area drains, where it is then conveyed to the culertised portion of Mill Brook on the east side of the site via underground piping, defined as Point of Analysis 1 (POA-1).

P- Watershed-2: This watershed consists of stormwater flows from the parking area, play area, and landscaped area on the east side of the site. Stormwater flows overland to proposed deep sump catch basins and is conveyed via underground pipe to a proposed underground infiltration system (UGS-1). In larger storm events, flows will discharge via an outlet control structure (OCS-1) and underground piping to an existing drain pipe that discharges to Mill Brook, defined as POA-1.

P- Watershed-2B: This watershed consists of the eastern portion of the proposed building. Stormwater is collected and piped underground via roof drain piping to a proposed underground infiltration system (UGS-1). In larger storm events, flows will discharge via an outlet control structure (OCS-1) and underground piping to an existing drain pipe that discharges to Mill Brook, defined as POA-1.

P- Watershed-3A: This watershed consists of paved parking areas, the Shouler Court paved roadway, pedestrian walkways, amphitheater area, and landscaped areas on the west side of the site that sheet flow overland to proposed deep sump catch basins. Stormwater flows are conveyed via underground piping to a proposed lined Rain Garden (RG-1). Stormwater passes through the soil media and the lined bioretention area channels the filtered stormwater through a perforated underdrain pipe at the bottom of the bioretention system that discharges to another proposed Rain Garden (RG-2), which also has an underdrain pipe collecting flow and discharging to the third Rain Garden (RG-3). This bioretention area has an underdrain and outlet control structure (OCS-2) discharging to the stormwater trunk line running along the north side of the proposed building. Flows from this trunk line are discharged to the culvertized portion of Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1). Note that the proposed Rain Garden (RG-1) has an emergency spillway weir for larger storm events, which discharges to RG-2.

P- Watershed-3B: This watershed consists of paved parking areas and landscaped areas, as well as flows from the upstream RG-1 (see P-Watershed-3A description) on the west side of the site that sheet flow overland to proposed deep sump catch basins. Stormwater flows are conveyed via underground piping to a proposed lined Rain Garden (RG-2). Stormwater passes through the soil media and the lined rain garden channels the filtered stormwater through a perforated underdrain pipe at the bottom of the rain garden that discharges to another proposed Rain Garden (RG-3), which also has an underdrain pipe and outlet control structure (OCS-2) discharging to the stormwater trunk line running along the north side of the proposed building. Flows from this trunk line are discharged to the culvertized portion of Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1). Note that the proposed Rain Garden (RG-2) has an emergency spillway weir for larger storm events, which discharges to RG-3.

P- Watershed-3C: This watershed consists of landscaped areas, as well as flows from the upstream RG-2 (see P-Watershed-3B description) on the west side of the site that sheet flow overland to proposed deep sump catch basins. Stormwater flows are conveyed via underground piping to a proposed lined Rain Garden (RG-3). Stormwater passes through the soil media and the lined rain garden channels the filtered stormwater through a perforated underdrain pipe at the bottom of the rain garden and is collected via an underdrain perforated pipe at the bottom of the rain garden that discharges to the stormwater trunk line running along the north side of the proposed building. Flows from this trunk line are discharged to the culvertized portion of Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1). Note that the proposed Rain Garden (RG-3) has an outlet control structure associated with its design for larger storm events, which discharges to the outlet pipe and trunk line.

P- Watershed-4: This watershed consists of pedestrian walkways and synthetic turf soccer field areas on the west side of the site that are collected via underdrain piping and area drains and passed through a series of small detention basins prior to discharging to the trunk line on the north side of the proposed building and ultimately discharging to the culvertized portion of Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1).

P- Watershed-5: This watershed consists of pedestrian walkways and synthetic turf baseball field areas on the east side of the site that are collected via underdrain piping and area drains and passed through a series of small detention basins prior to discharging to the culvertized portion of Mill Brook on the east side of the site, defined as Point of Analysis 1 (POA-1).

Flood Storage

As discussed previously within this report the site is graphically located within Flood Zones X and AE per FEMA mapping, but the actual elevations per the Flood Impact Study occur within the banks of the Mill Brook. There is a small compensatory storage area on the east side of the existing building that was for a previous project but not defined by elevations or compensatory storage volumes. This area will be disturbed by the proposed High School project. The proposed project even though not within flood plain elevations will emulate the existing compensatory storage by providing compensatory storage within the stone of the turf fields that far exceed the volume held by the existing flood storage area.

Results/ Summary

Analysis:
The analysis was based on the pre and post development peak discharge rates at the point of analysis. The proposed construction of the school campus will result in an increase in impervious area, therefore the proposed stormwater management system will be designed to mitigate any increase in the rate of runoff and improve stormwater quality in accordance with the requirements of the Massachusetts Stormwater Management Policy Standards.

Results of Analysis:
Through the use of the HydroCAD Software, the curve numbers, times of concentrations, and peak discharge rates were determined for both the existing conditions and the proposed conditions. The results of the study shows that both the post-development peak rates of runoff are equal or less than the existing rates.

As shown in Table 1, the post development peak rates of runoff from the site to each POA will be mitigated.

Table 1 – POA-1 : Peak Rates of Runoff

	2-year storm (cfs)	10-year storm (cfs)	25-year storm (cfs)	100-year storm (cfs)
Existing	21.47	39.53	52.75	76.96
Proposed	20.97	39.44	49.50	69.87

Stormwater Management Standards

The Department of Environmental Protection has implemented the Stormwater Management Standards as of November 18, 1996 and updated them in April 2008. The standards met are described below and in the Stormwater Management Form as provided by DEP.

Standard #1: Untreated Stormwater

The project is designed so that stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, wetlands or waters.

Therefore Standard #1 is met.

Standard #2: Post-development peak discharge rates

The proposed construction of Arlington High School will result in an overall site increase in impervious area. The proposed stormwater management system has been designed so that there is no increase in post construction discharge rates from the site for each point of analysis by the introduction of stormwater BMPS such as bioretention areas and underground infiltration basins. See Table 1 of this report for existing and proposed flows to the Point of Analysis, showing that Standard #2 is met.

Therefore Standard #2 is met.

Standard #3: Recharge to groundwater

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

Soil types have been identified based on the information contained in the Soil Report (see Soil Report within appendices of this report). Based on the available soil information provided in the appendices of this report, we have determined that the soils are consistent with Hydrologic soil type "B" which require runoff to be infiltrated (as listed in the table below) from new impervious areas. Test pit data from testing done on site confirms the Soil Report information in the appendices of this report.

Hydrologic Group Volume to Recharge x (Total Impervious Area)	
Hydrologic Group	Volume to Recharge x Total Impervious Area
A	0.60 inches of runoff
B	0.35 inches of runoff
C	0.25 inches of runoff
D	0.10 inches of runoff

<u>"B" Soils</u>

Infiltration Rate: 0.35 inches of runoff
Existing Impervious Area: 7.78 Ac. (338,984 sf)
Proposed Impervious Area: 8.63 Ac. (375,923 sf)
Proposed Site New Impervious Area in "B" Soils: 36,939 sf
36,939 sf x 0.35 x (1/12) = 1,077 cf

Total required recharge volume: 1,077 cf

Proposed Recharge Volume:
Infiltration System UGS-1 = 2,498 cf

Total provided recharge volume: 2,498 cf

Drawdown Time:

UGS-1 (maximum time 72 hours)= 2,523 cf / (1.02 in/hr x 1,672 sf / 12 in/ft) = 17.75 hours

Therefore Standard #3 is met.

Standard #4: TSS removal

The BMP's selected to remove TSS from impervious areas for this include: Deep Sump Catch Basins (CB), Water Quality Units (WQU), three (3) bioretention areas & an Infiltration System (UGS-1). Building roof runoff is considered "clean" and therefore does not require TSS removal.

P-Watershed-1: (Parking, Walkways)
Deep Sump Catch Basin: (1.00)(1.00-0.25)= 0.75
Water Quality Unit: (0.75)(1.00-0.80)=0.15
Total TSS Removal= 85%

P-Watershed-1A: (Parking, Walkways)
Deep Sump Catch Basin: (1.00)(1.00-0.25)= 0.75
Water Quality Unit: (0.75)(1.00-0.80)=0.15
Total TSS Removal= 85%

P-Watershed-2: (Parking, Walkways)
Deep Sump Catch Basin: (1.00)(1.00-0.25)= 0.75
Infiltration Basin: (0.75)(1.00-0.80)=0.15
Total TSS Removal= 85%

P-Watershed-3A: (Parking, Walkways)
Deep Sump Catch Basin: (1.00)(1.00-0.25)= 0.75
Bioretention Area: (0.75)(1.00-0.90)=0.075
Bioretention Area: (0.08)(1.00-0.90)=0.008
Bioretention Area: (0.01)(1.00-0.90)=0.001
Total TSS Removal= 99.9%

P-Watershed-3B: (Parking)
Deep Sump Catch Basin: (1.00)(1.00-0.25)= 0.75
Bioretention Area: (0.75)(1.00-0.90)=0.075
Bioretention Area: (0.08)(1.00-0.90)=0.008
Total TSS Removal= 99%

Water Quality Volume:

The project qualifies for the 0.5" runoff rate applied to the total impervious area for the water quality volume, as shown in the calculations provided below. The calculations for the infiltration stormwater BMPs are shown below. Where site topography and groundwater elevation precluded the use of infiltration BMPs, proprietary water quality unit are proposed which are specifically designed to address water quality prior to discharge. Roof runoff is considered "clean" and has therefore been excluded from this calculation.

Impervious area requiring water quality treatment= 82,241 sf
82,241 sf * .0417 ft = 3,429 CF

Total Water Quality Volume Required = 3,429 CF

Proposed Water Quality Volume:
Infiltration System UGS-1 = 2,498 cf
Bioretention System RG-1 = 333 cf
Bioretention System RG-2 = 609 cf
Bioretention System RG-3 = 890 cf

Total provided water quality volume: 4,330 cf

Therefore Standard #4 is met.

Standard #5: Higher potential pollutant loads

The project site does not contain Land Uses with Higher Potential Pollutant Loads, therefore Standard #5 is met.

Standard #6: Protection of critical areas

Critical areas are Outstanding Resource Waters (ORW) as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02 (Zone Is, Zone IIs and Interim Wellhead Protection Areas for groundwater sources and Zone As for surface water sources), bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

The site is not located within critical areas, therefore Standard #6 is met.

Standard #7: Redevelopment projects

While a portion of the site is being redeveloped, there is an increase in impervious area, thus the project is considered New Construction and all of the Standards will be met.

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

Soil Erosion and Sediment Control Plan:
The objectives of the Soil Erosion and Sediment Control Plan are to control erosion at its source with temporary control structures, minimize the runoff from areas of disturbance, and de-concentrate and distribute stormwater runoff through natural vegetation before discharge to critical zones such as streams or wetlands. Soil erosion control does not begin with the perimeter sediment trap. It begins at the source of the sediment, the disturbed land areas, and extends down to the control structure.

The Soil Erosion and Sediment Control Plan will be enacted in order to protect the resource areas during construction. The erosion control devices will remain in place until all exposed areas have been stabilized with vegetation or impervious surfaces.

The objective of the Soil Erosion & Sediment Control Plan that will be enacted on site is to control the vulnerability of the soil to the erosion process or the capability of moving water to detach soil particles during the construction phase(s).

The soil erosion and sediment control BMP's for the site are straw wattles with silt fence, catch basin filters, and a construction entrance as shown on design plans prepared by Samiotes Consultants, Inc.

Therefore Standard #8 is met.

Standard #9: Operation/maintenance plan

An operation and maintenance plan for both construction and post-development stormwater controls has been developed. The plan includes owner(s); parties responsible for operation and maintenance; schedule for inspection and maintenance; routine and non-routine maintenance tasks. A copy of the O&M is included in the appendices of this report.

Therefore Standard #9 is met.

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

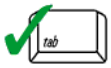
It is not anticipated that there will be any Illicit discharges for the project as it will be new construction, therefore Standard #10 is met.

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

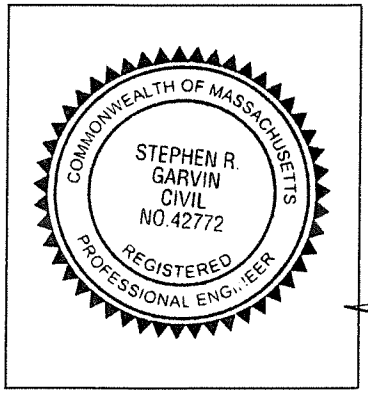
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



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Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX 1:
Existing Hydrology Calculations

APPENDIX 2:
Proposed Hydrology Calculations

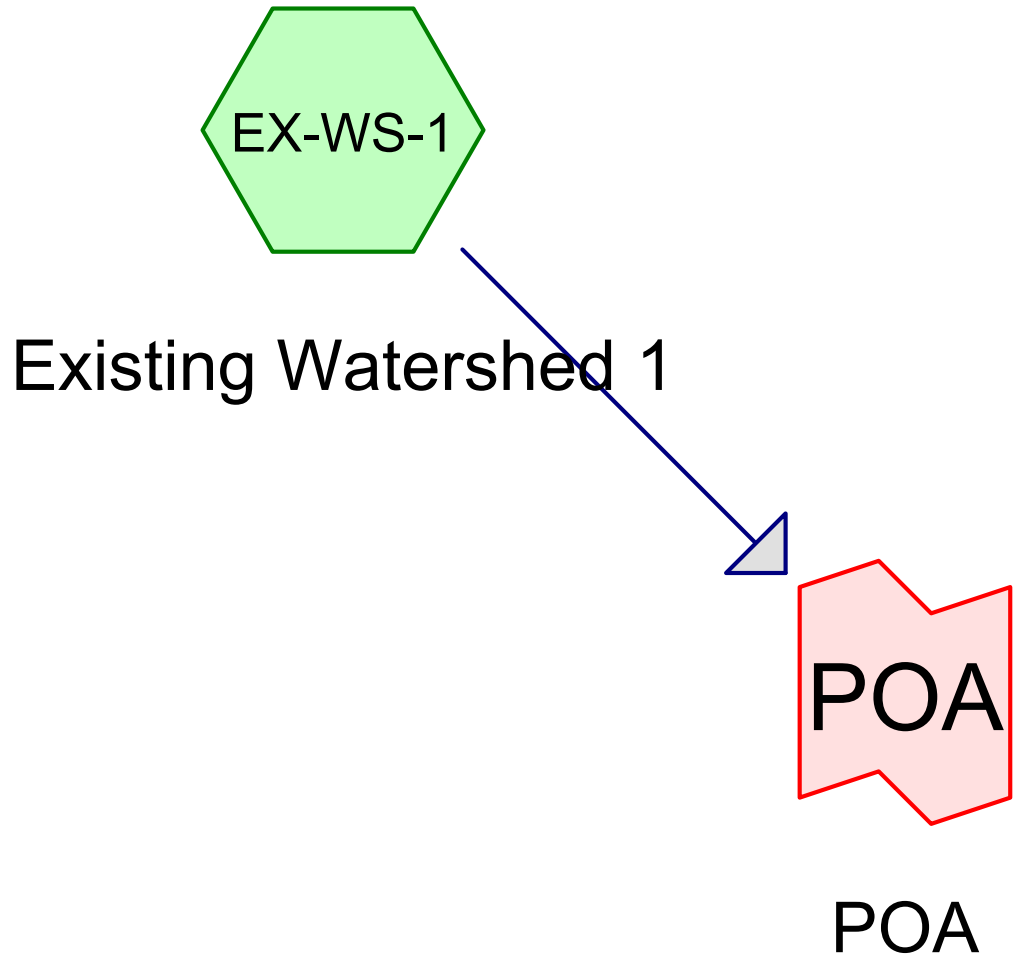
APPENDIX 3:
Test Pit Logs
Soils Report

APPENDIX 4:
Operations and Maintenance Plan

APPENDIX 5:
Calculations

APPENDIX 6:
Sketches

APPENDIX 1:
Existing Hydrology Calculations



Subcat Reach Pond Link

Routing Diagram for 17211.00 Arlington HS - Existing Conditions
Prepared by Samiotes Engineering, Printed 5/7/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.598	61	>75% Grass cover, Good, HSG B (EX-WS-1)
5.051	98	Impervious (EX-WS-1)
2.731	98	Roofs, HSG B (EX-WS-1)
0.020	55	Woods, Good, HSG B (EX-WS-1)
17.400	**78**	**TOTAL AREA**

Summary for Subcatchment EX-WS-1: Existing Watershed 1

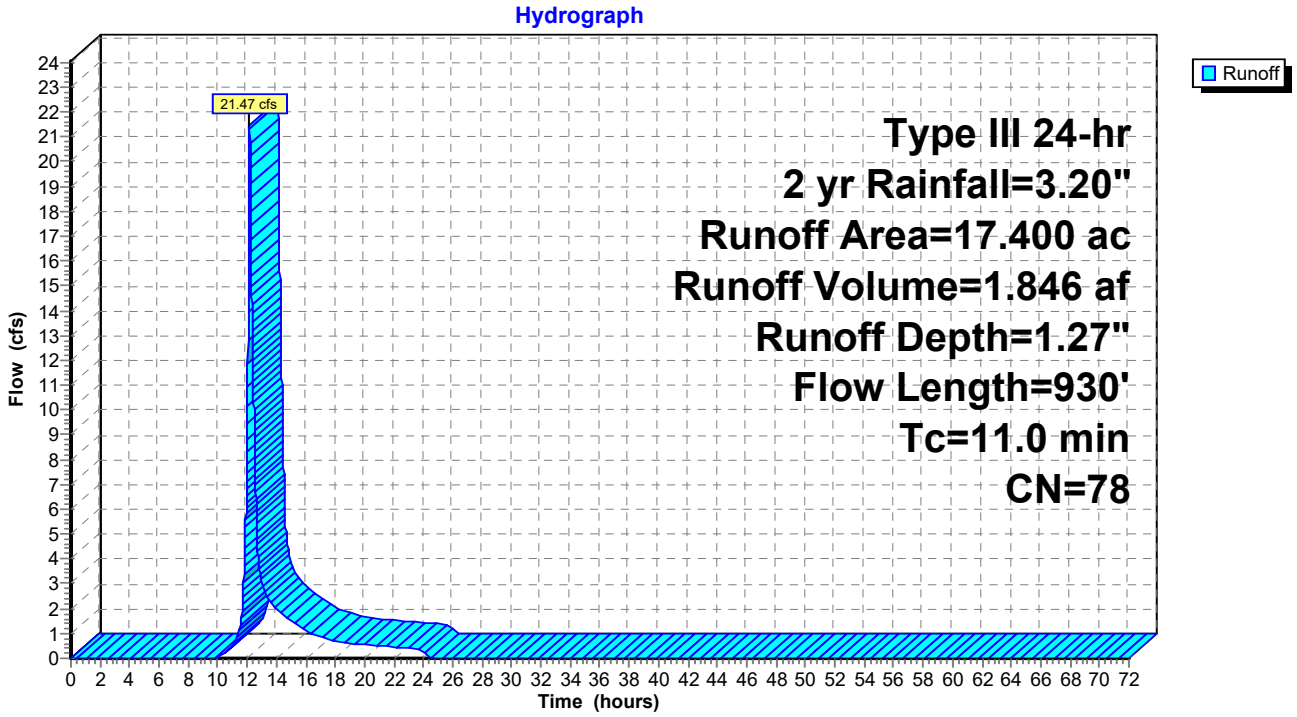
Runoff = 21.47 cfs @ 12.16 hrs, Volume= 1.846 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (ac)	CN	Description
*	5.051	98	Impervious
	2.731	98	Roofs, HSG B
	9.598	61	>75% Grass cover, Good, HSG B
	0.020	55	Woods, Good, HSG B
	17.400	78	Weighted Average
	9.618		55.28% Pervious Area
	7.782		44.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
1.9	220	0.0140	1.90		**Shallow Concentrated Flow, 220' SCF** Unpaved Kv= 16.1 fps
0.9	140	0.0150	2.49		**Shallow Concentrated Flow, 140' SCF (paved)** Paved Kv= 20.3 fps
0.1	20	0.0100	4.91	3.86	**Pipe Channel, 12" Pipe Flow** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.7	500	0.0050	11.67	466.77	**Pipe Channel, Box Culvert Flow** 96.0" x 60.0" Box Area= 40.0 sf Perim= 26.0' r= 1.54' n= 0.012
11.0	930	Total			

Subcatchment EX-WS-1: Existing Watershed 1

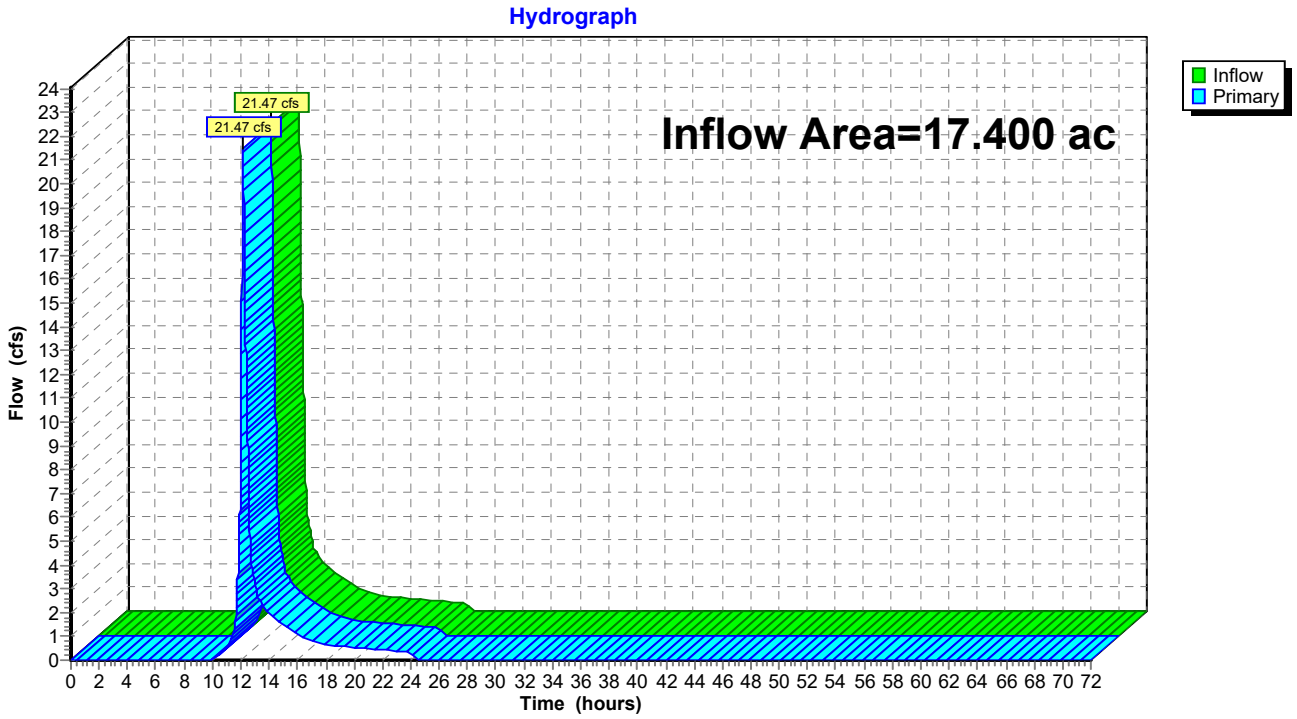


Summary for Link POA: POA

Inflow Area = 17.400 ac, 44.72% Impervious, Inflow Depth = 1.27" for 2 yr event
Inflow = 21.47 cfs @ 12.16 hrs, Volume= 1.846 af
Primary = 21.47 cfs @ 12.16 hrs, Volume= 1.846 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



Summary for Subcatchment EX-WS-1: Existing Watershed 1

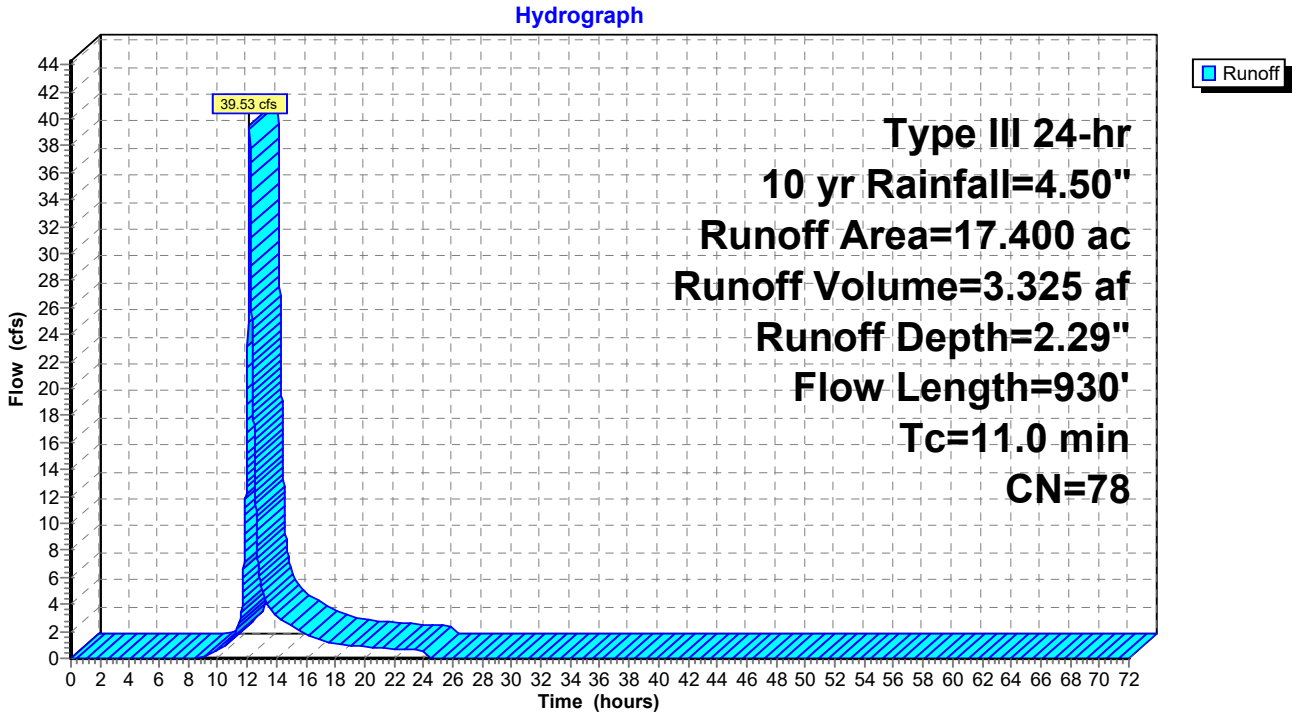
Runoff = 39.53 cfs @ 12.16 hrs, Volume= 3.325 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (ac)	CN	Description
*	5.051	98	Impervious
	2.731	98	Roofs, HSG B
	9.598	61	>75% Grass cover, Good, HSG B
	0.020	55	Woods, Good, HSG B
	17.400	78	Weighted Average
	9.618		55.28% Pervious Area
	7.782		44.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
1.9	220	0.0140	1.90		**Shallow Concentrated Flow, 220' SCF** Unpaved Kv= 16.1 fps
0.9	140	0.0150	2.49		**Shallow Concentrated Flow, 140' SCF (paved)** Paved Kv= 20.3 fps
0.1	20	0.0100	4.91	3.86	**Pipe Channel, 12" Pipe Flow** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.7	500	0.0050	11.67	466.77	**Pipe Channel, Box Culvert Flow** 96.0" x 60.0" Box Area= 40.0 sf Perim= 26.0' r= 1.54' n= 0.012
11.0	930	Total			

Subcatchment EX-WS-1: Existing Watershed 1

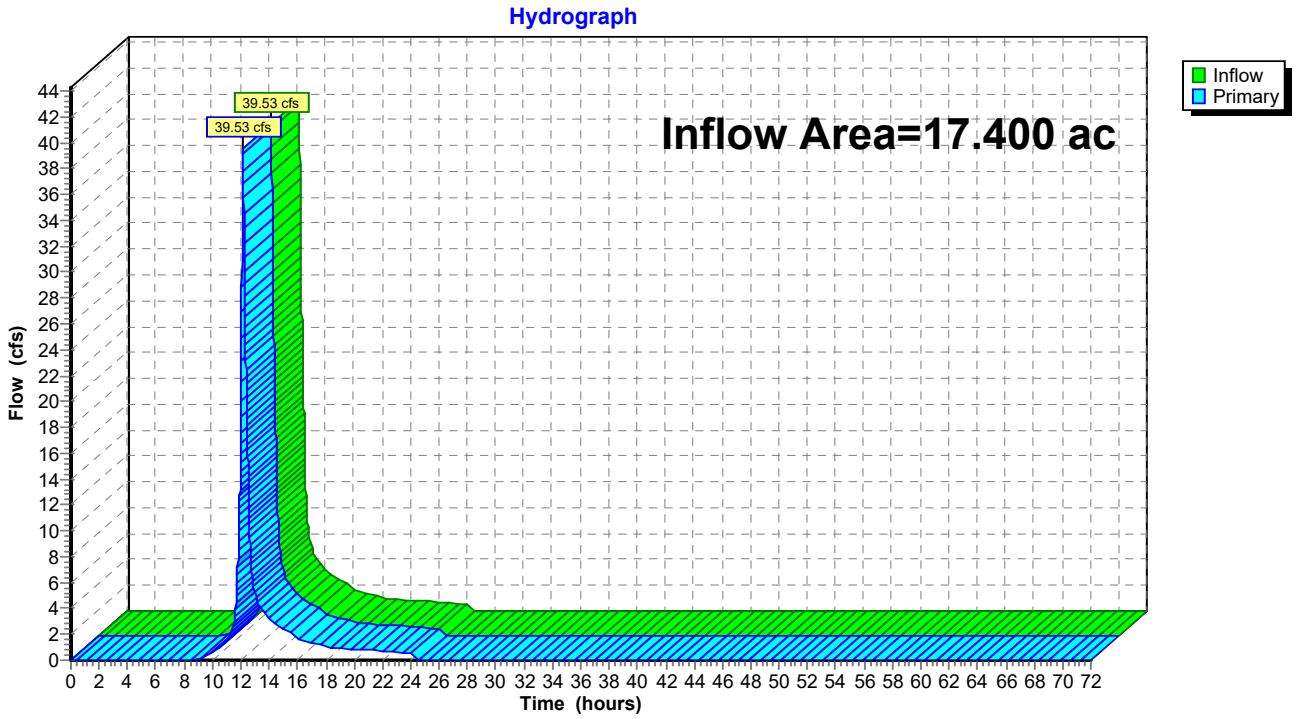


Summary for Link POA: POA

Inflow Area = 17.400 ac, 44.72% Impervious, Inflow Depth = 2.29" for 10 yr event
Inflow = 39.53 cfs @ 12.16 hrs, Volume= 3.325 af
Primary = 39.53 cfs @ 12.16 hrs, Volume= 3.325 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



Summary for Subcatchment EX-WS-1: Existing Watershed 1

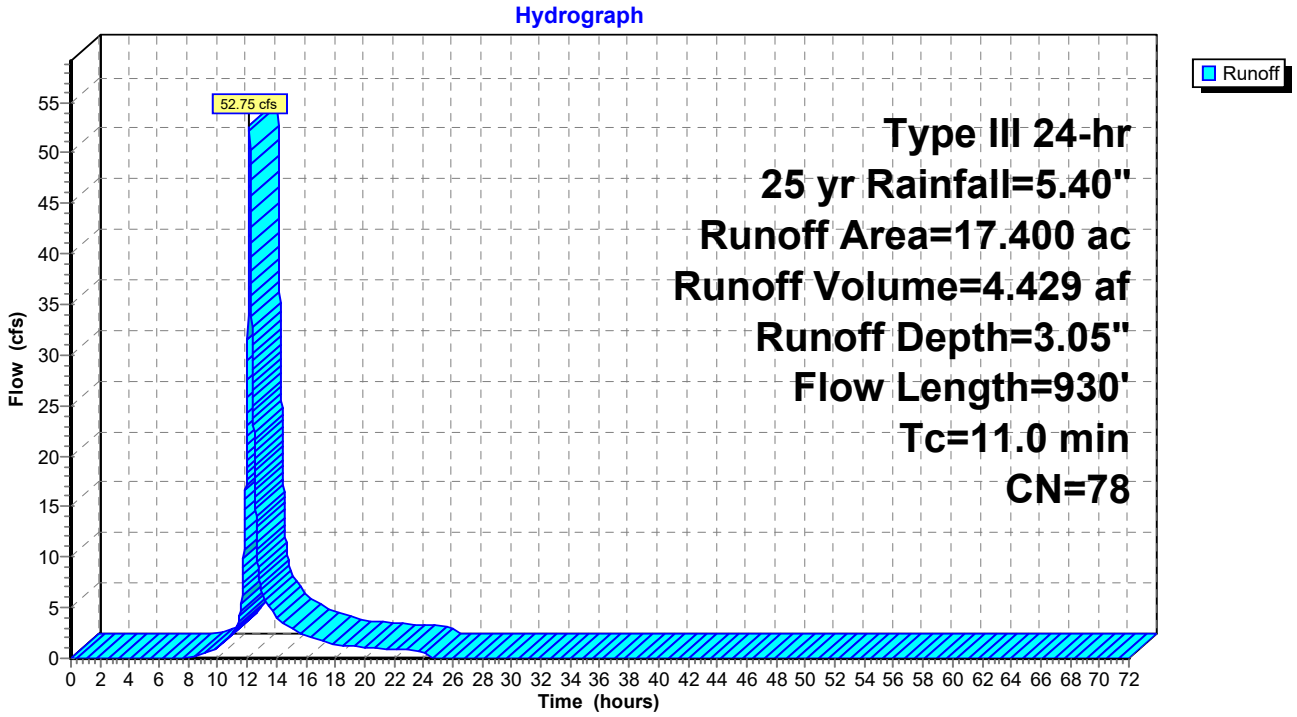
Runoff = 52.75 cfs @ 12.15 hrs, Volume= 4.429 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (ac)	CN	Description
*	5.051	98	Impervious
	2.731	98	Roofs, HSG B
	9.598	61	>75% Grass cover, Good, HSG B
	0.020	55	Woods, Good, HSG B
	17.400	78	Weighted Average
	9.618		55.28% Pervious Area
	7.782		44.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
1.9	220	0.0140	1.90		**Shallow Concentrated Flow, 220' SCF** Unpaved Kv= 16.1 fps
0.9	140	0.0150	2.49		**Shallow Concentrated Flow, 140' SCF (paved)** Paved Kv= 20.3 fps
0.1	20	0.0100	4.91	3.86	**Pipe Channel, 12" Pipe Flow** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.7	500	0.0050	11.67	466.77	**Pipe Channel, Box Culvert Flow** 96.0" x 60.0" Box Area= 40.0 sf Perim= 26.0' r= 1.54' n= 0.012
11.0	930	Total			

Subcatchment EX-WS-1: Existing Watershed 1

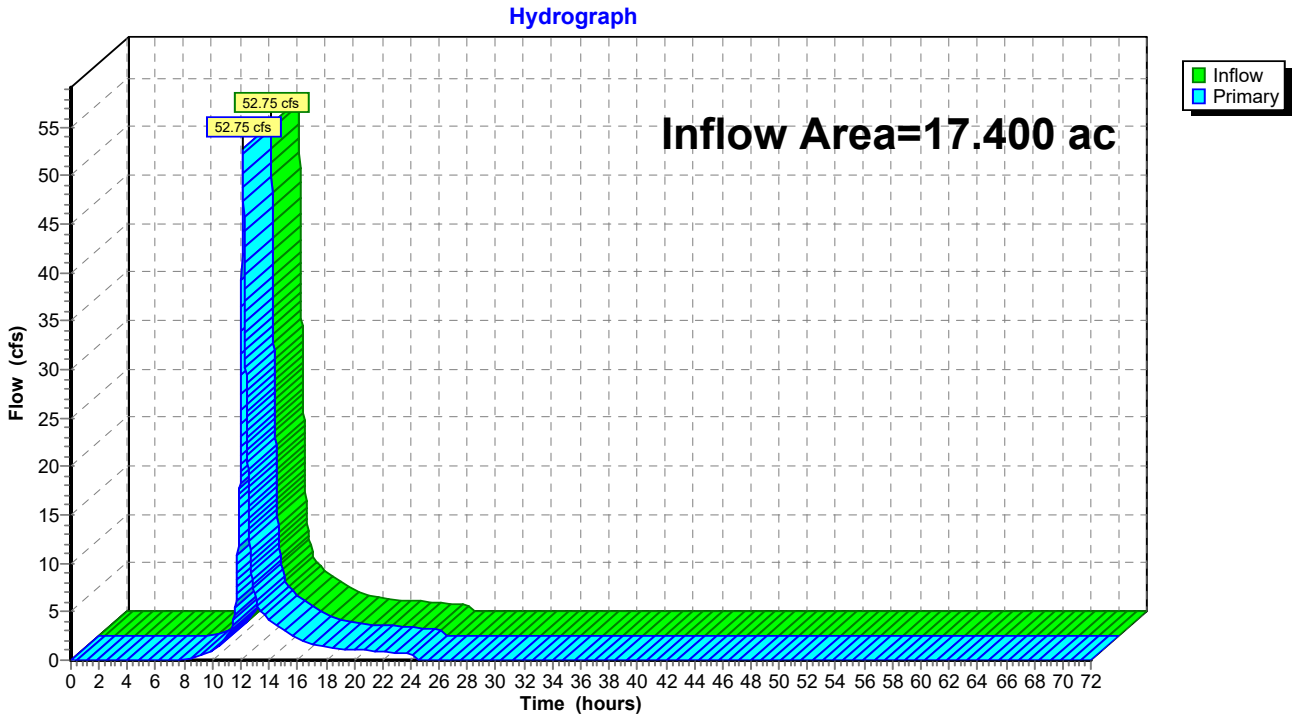


Summary for Link POA: POA

Inflow Area = 17.400 ac, 44.72% Impervious, Inflow Depth = 3.05" for 25 yr event
Inflow = 52.75 cfs @ 12.15 hrs, Volume= 4.429 af
Primary = 52.75 cfs @ 12.15 hrs, Volume= 4.429 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



Summary for Subcatchment EX-WS-1: Existing Watershed 1

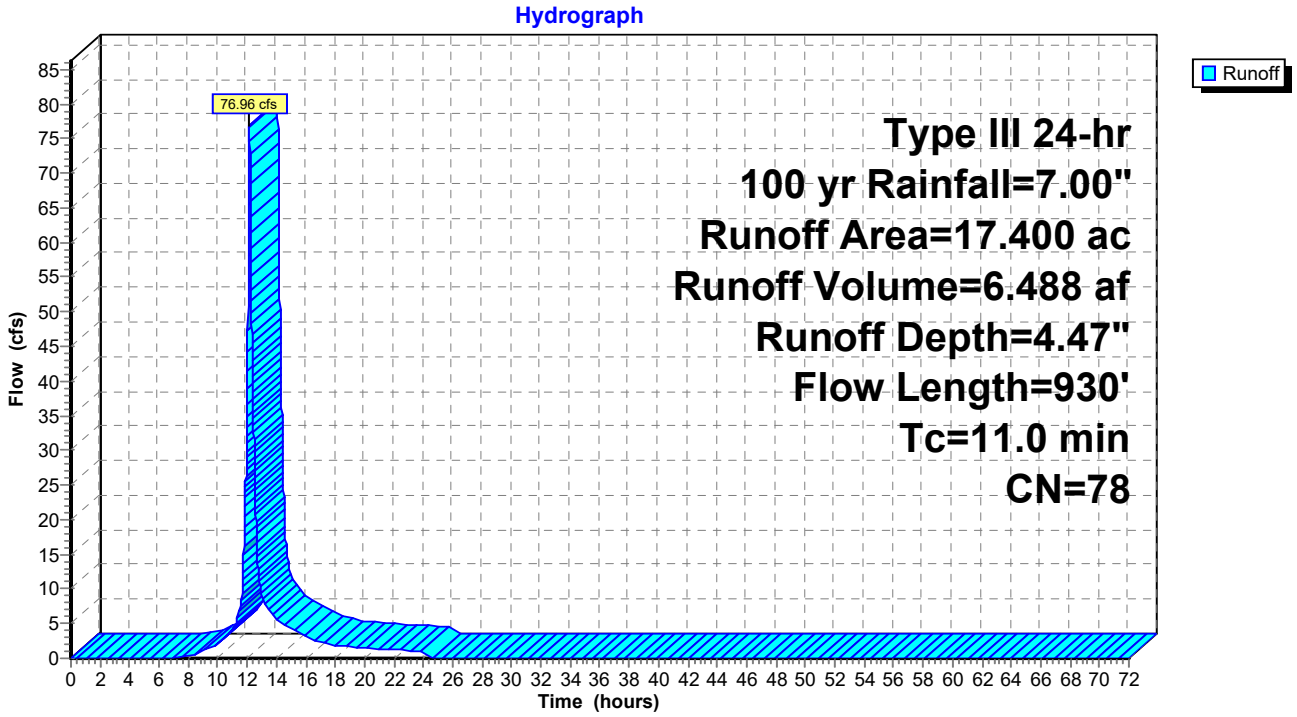
Runoff = 76.96 cfs @ 12.15 hrs, Volume= 6.488 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (ac)	CN	Description
*	5.051	98	Impervious
	2.731	98	Roofs, HSG B
	9.598	61	>75% Grass cover, Good, HSG B
	0.020	55	Woods, Good, HSG B
	17.400	78	Weighted Average
	9.618		55.28% Pervious Area
	7.782		44.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
1.9	220	0.0140	1.90		**Shallow Concentrated Flow, 220' SCF** Unpaved Kv= 16.1 fps
0.9	140	0.0150	2.49		**Shallow Concentrated Flow, 140' SCF (paved)** Paved Kv= 20.3 fps
0.1	20	0.0100	4.91	3.86	**Pipe Channel, 12" Pipe Flow** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.7	500	0.0050	11.67	466.77	**Pipe Channel, Box Culvert Flow** 96.0" x 60.0" Box Area= 40.0 sf Perim= 26.0' r= 1.54' n= 0.012
11.0	930	Total			

Subcatchment EX-WS-1: Existing Watershed 1

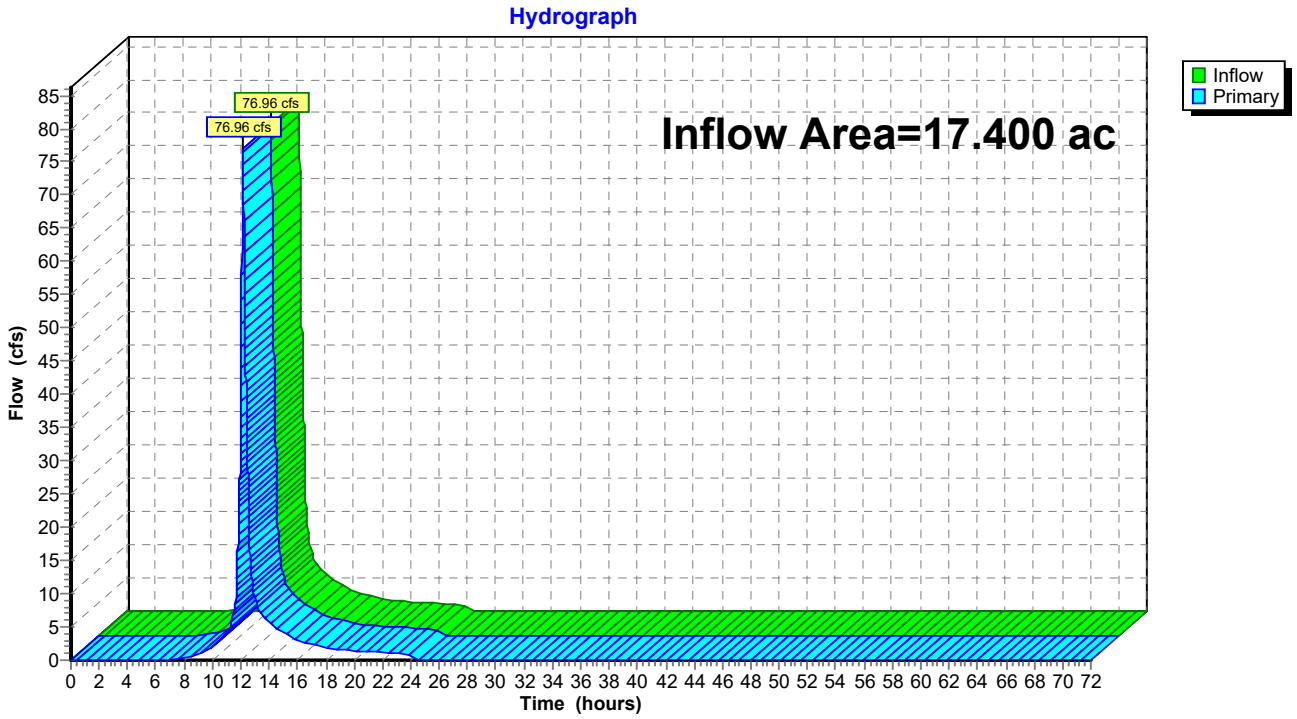


Summary for Link POA: POA

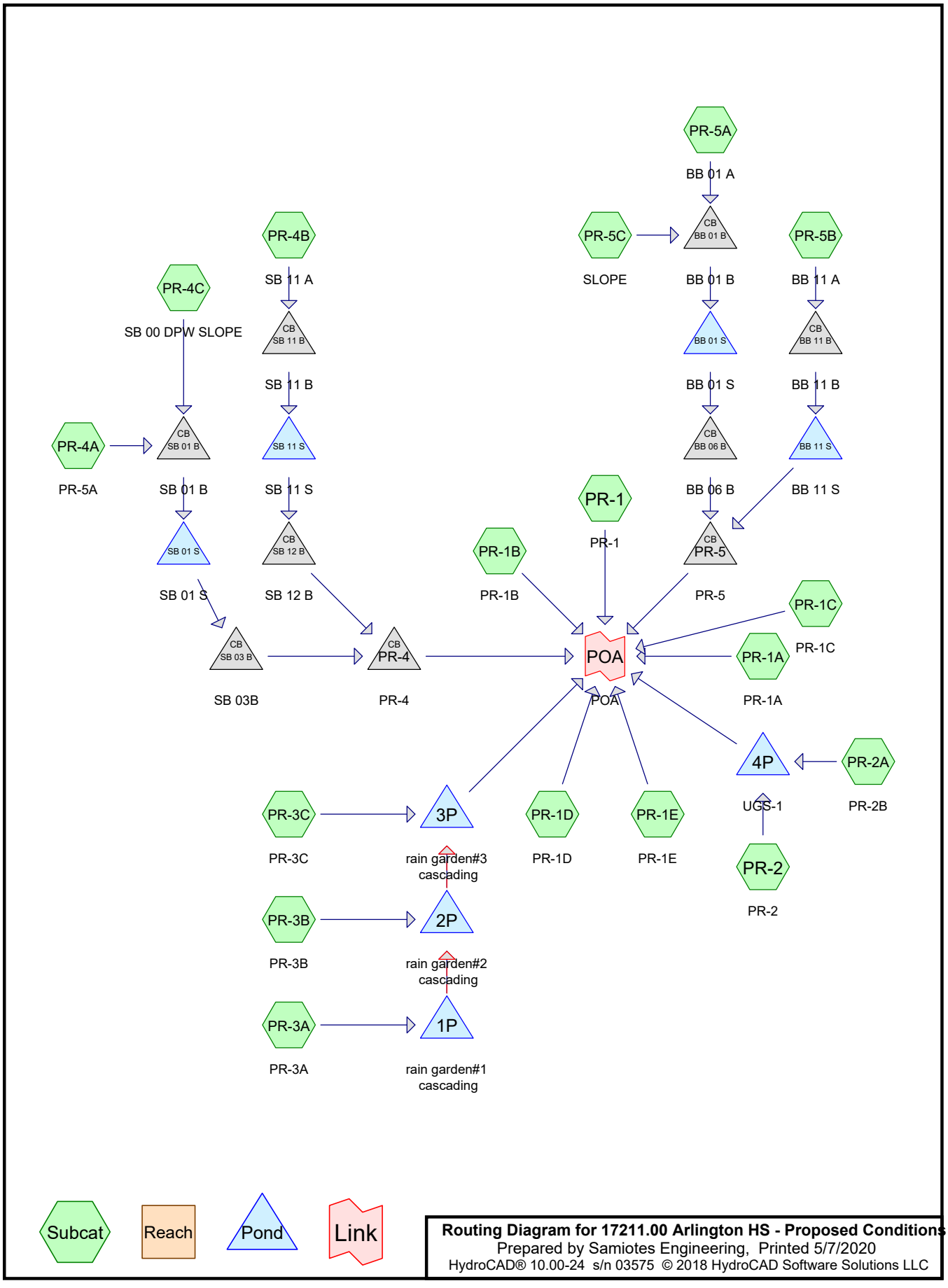
Inflow Area = 17.400 ac, 44.72% Impervious, Inflow Depth = 4.47" for 100 yr event
Inflow = 76.96 cfs @ 12.15 hrs, Volume= 6.488 af
Primary = 76.96 cfs @ 12.15 hrs, Volume= 6.488 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



APPENDIX 2:
Proposed Hydrology Calculations



Routing Diagram for 17211.00 Arlington HS - Proposed Conditions
Prepared by Samiotes Engineering, Printed 5/7/2020
HydroCAD® 10.00-24 s/n 03575 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.695	61	>75% Grass cover, Good, HSG B (PR-1, PR-1A, PR-1C, PR-1E, PR-2, PR-3A, PR-3B, PR-3C, PR-4C, PR-5C)
4.964	98	Paved parking, HSG B (PR-1, PR-1A, PR-1C, PR-1E, PR-2, PR-3A, PR-3B)
3.627	98	Roofs, HSG B (PR-1B, PR-1D, PR-2A)
4.056	85	SYNTHETIC TURF- PAD- LINER (PR-4A, PR-4B, PR-5A, PR-5B)
0.025	98	Unconnected pavement, HSG B (PR-4C)
0.014	98	Unconnected roofs, HSG B (PR-5C)
0.020	55	Woods, Good, HSG B (PR-1C)
17.400	**85**	**TOTAL AREA**

Summary for Subcatchment PR-1: PR-1

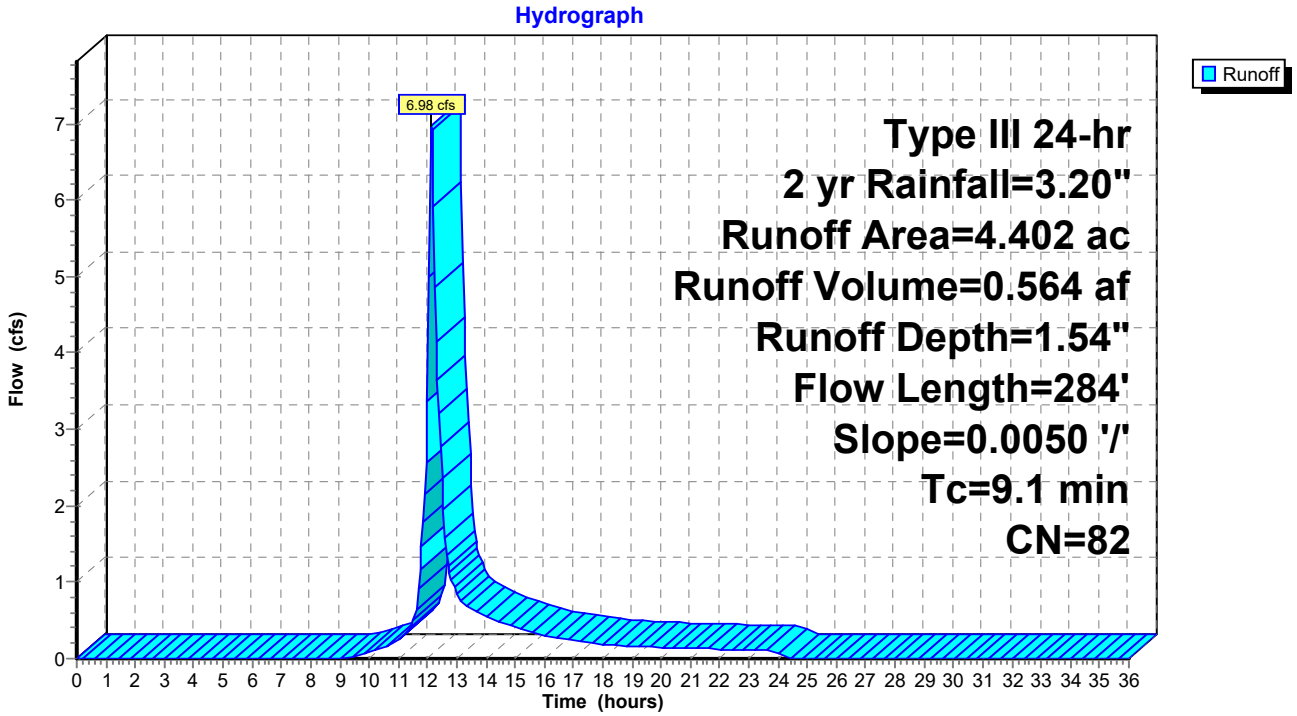
Runoff = 6.98 cfs @ 12.13 hrs, Volume= 0.564 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
1.892	61	>75% Grass cover, Good, HSG B
2.510	98	Paved parking, HSG B
4.402	82	Weighted Average
1.892		42.98% Pervious Area
2.510		57.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	50	0.0050	0.69		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
7.9	234	0.0050	0.49		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
9.1	284	Total			

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-1A: PR-1A

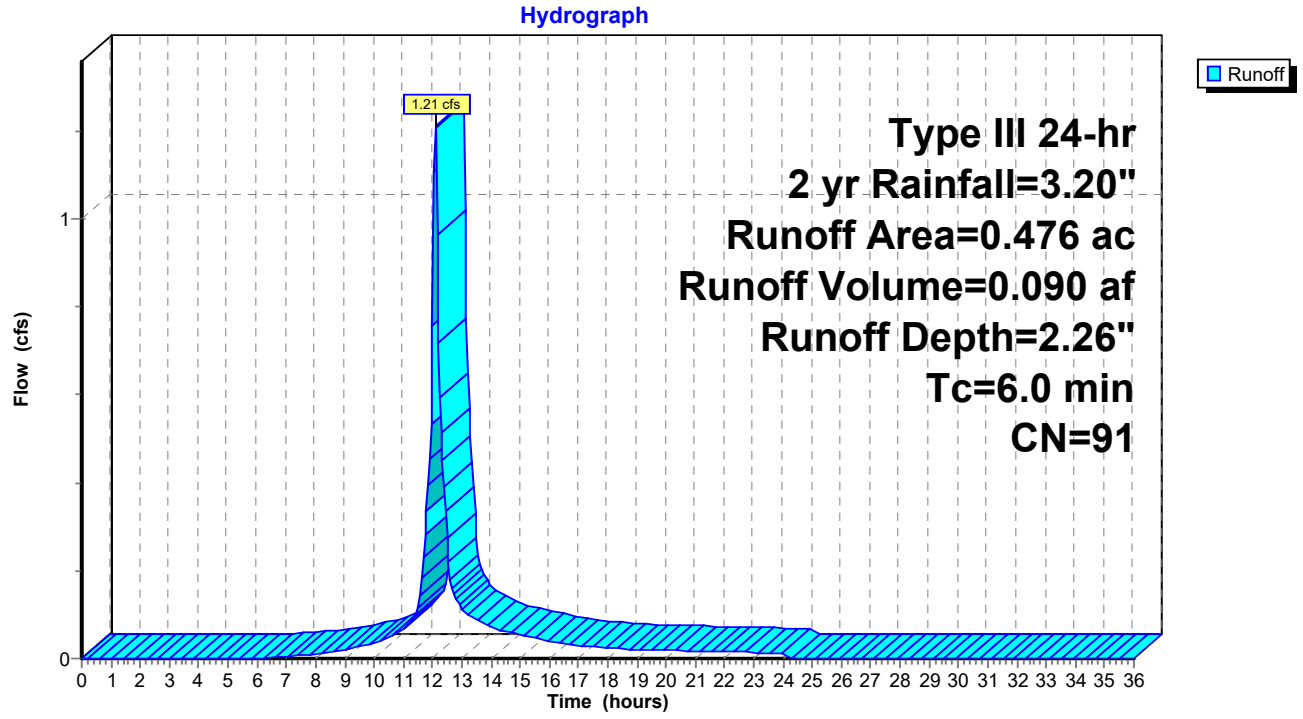
Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.090 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.090	61	>75% Grass cover, Good, HSG B
0.386	98	Paved parking, HSG B
0.476	91	Weighted Average
0.090		18.91% Pervious Area
0.386		81.09% Impervious Area

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

Subcatchment PR-1A: PR-1A



Summary for Subcatchment PR-1B: PR-1B

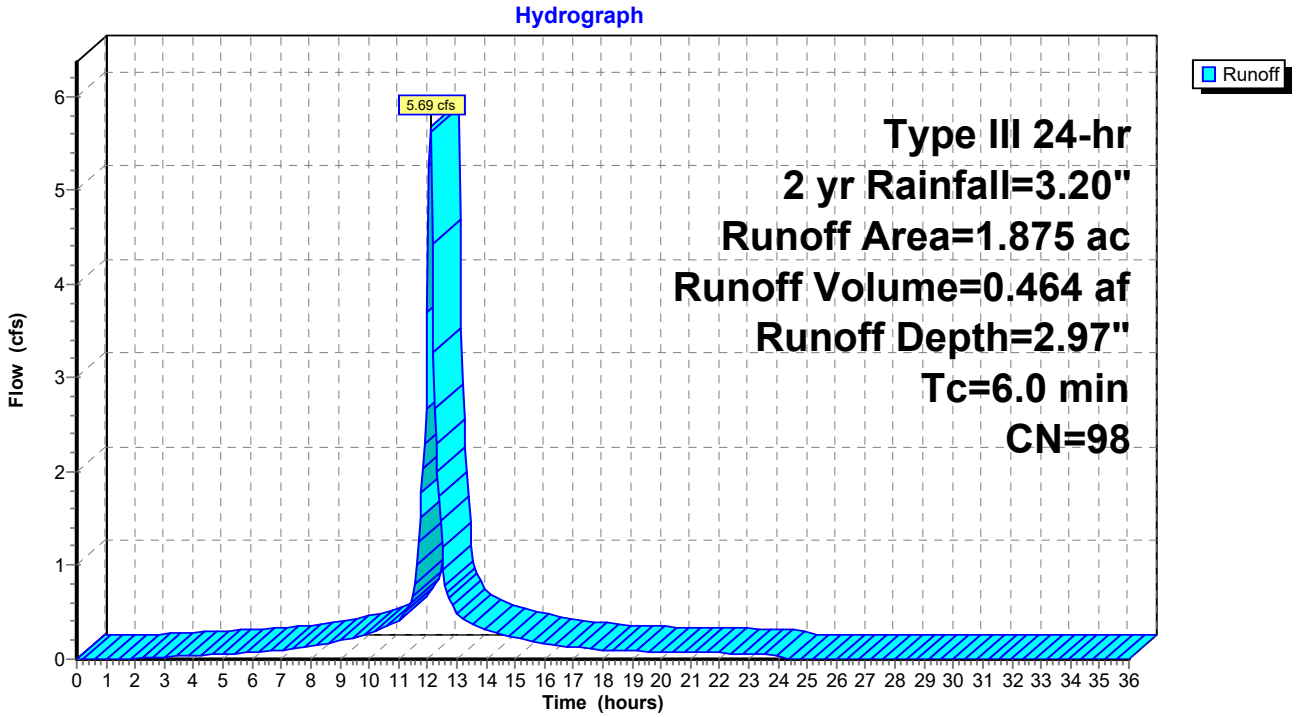
Runoff = 5.69 cfs @ 12.09 hrs, Volume= 0.464 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
1.875	98	Roofs, HSG B
1.875		100.00% Impervious Area

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

Subcatchment PR-1B: PR-1B



Summary for Subcatchment PR-1C: PR-1C

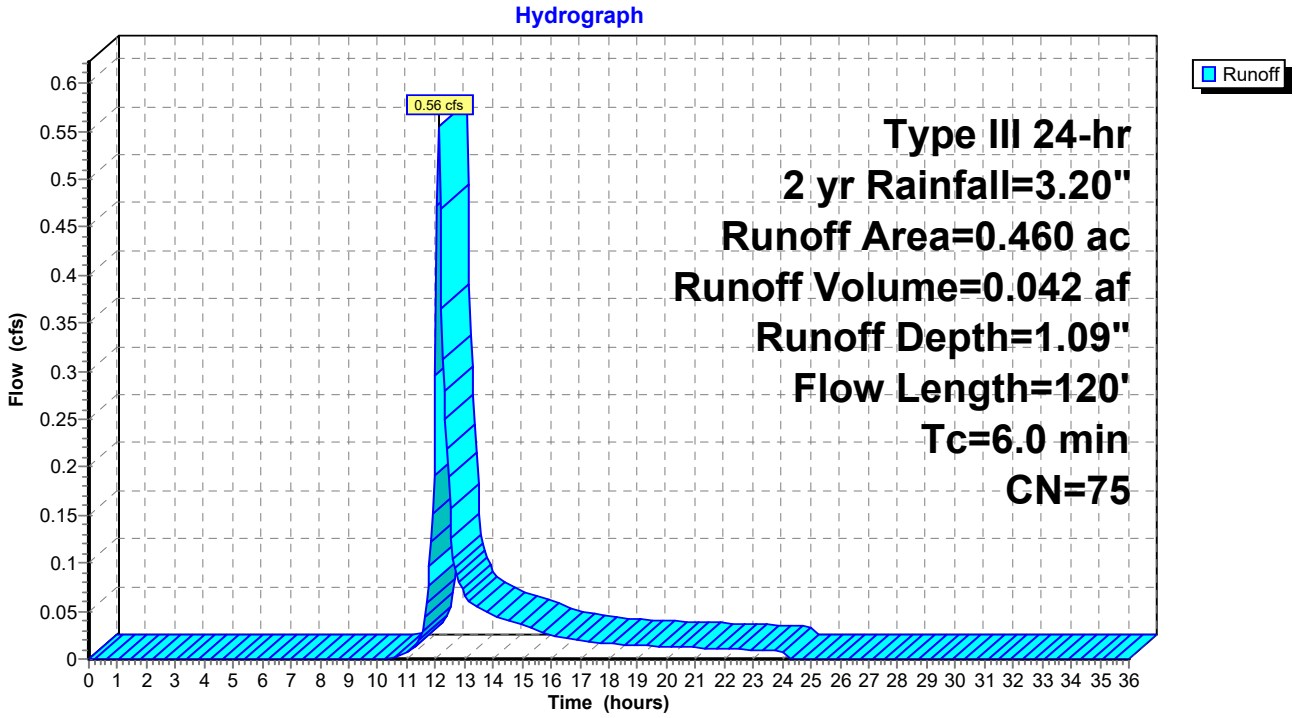
Runoff = 0.56 cfs @ 12.10 hrs, Volume= 0.042 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.020	55	Woods, Good, HSG B
0.260	61	>75% Grass cover, Good, HSG B
0.180	98	Paved parking, HSG B
0.460	75	Weighted Average
0.280		60.87% Pervious Area
0.180		39.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		**Sheet Flow, 20' SF** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	40	0.5000	0.35		**Sheet Flow, 30' SF** Grass: Dense n= 0.240 P2= 3.20"
0.1	12	0.0100	1.61		**Shallow Concentrated Flow, 12' SCF** Unpaved Kv= 16.1 fps
0.2	48	0.0400	4.06		**Shallow Concentrated Flow, 48' SCF** Paved Kv= 20.3 fps
5.8	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-1C: PR-1C



Summary for Subcatchment PR-1D: PR-1D

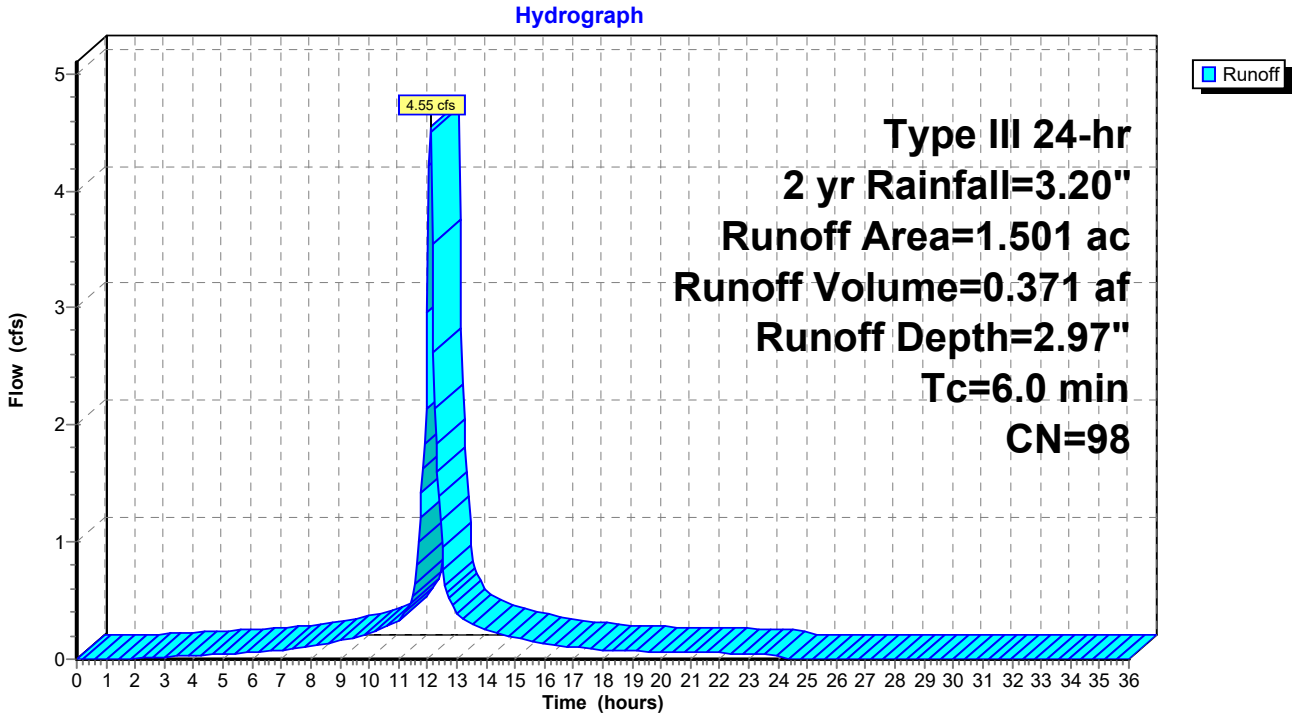
Runoff = 4.55 cfs @ 12.09 hrs, Volume= 0.371 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
1.501	98	Roofs, HSG B
1.501		100.00% Impervious Area

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

Subcatchment PR-1D: PR-1D



Summary for Subcatchment PR-1E: PR-1E

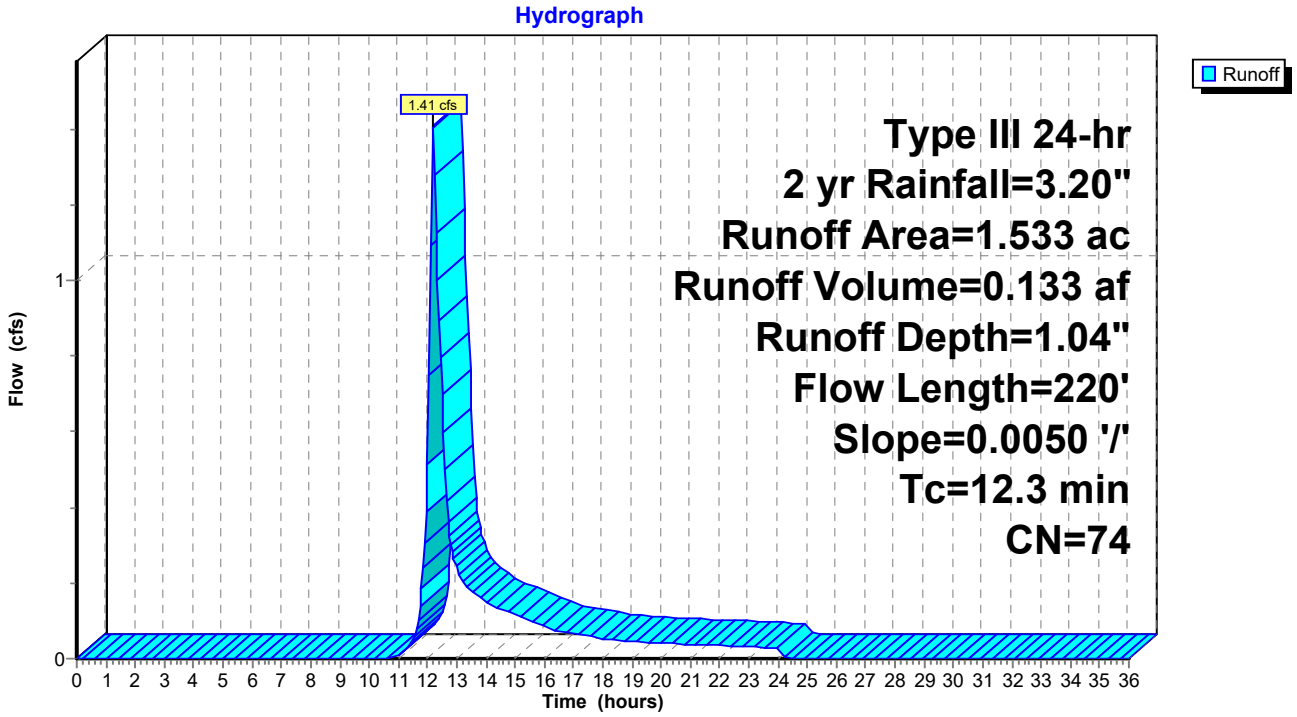
Runoff = 1.41 cfs @ 12.19 hrs, Volume= 0.133 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.533	98	Paved parking, HSG B
1.533	74	Weighted Average
1.000		65.23% Pervious Area
0.533		34.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
2.5	170	0.0050	1.14		**Shallow Concentrated Flow, 170' SCF** Unpaved Kv= 16.1 fps
12.3	220	Total			

Subcatchment PR-1E: PR-1E



Summary for Subcatchment PR-2: PR-2

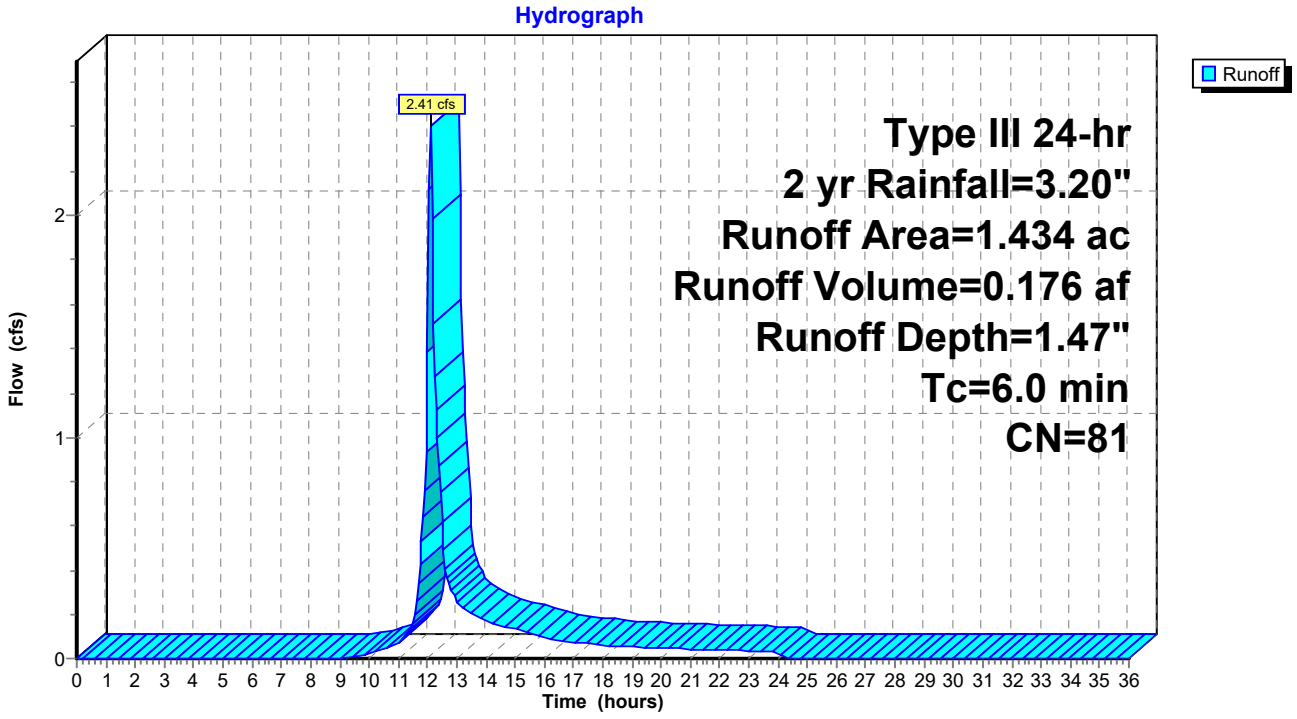
Runoff = 2.41 cfs @ 12.10 hrs, Volume= 0.176 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.672	61	>75% Grass cover, Good, HSG B
0.762	98	Paved parking, HSG B
1.434	81	Weighted Average
0.672		46.86% Pervious Area
0.762		53.14% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-2A: PR-2B

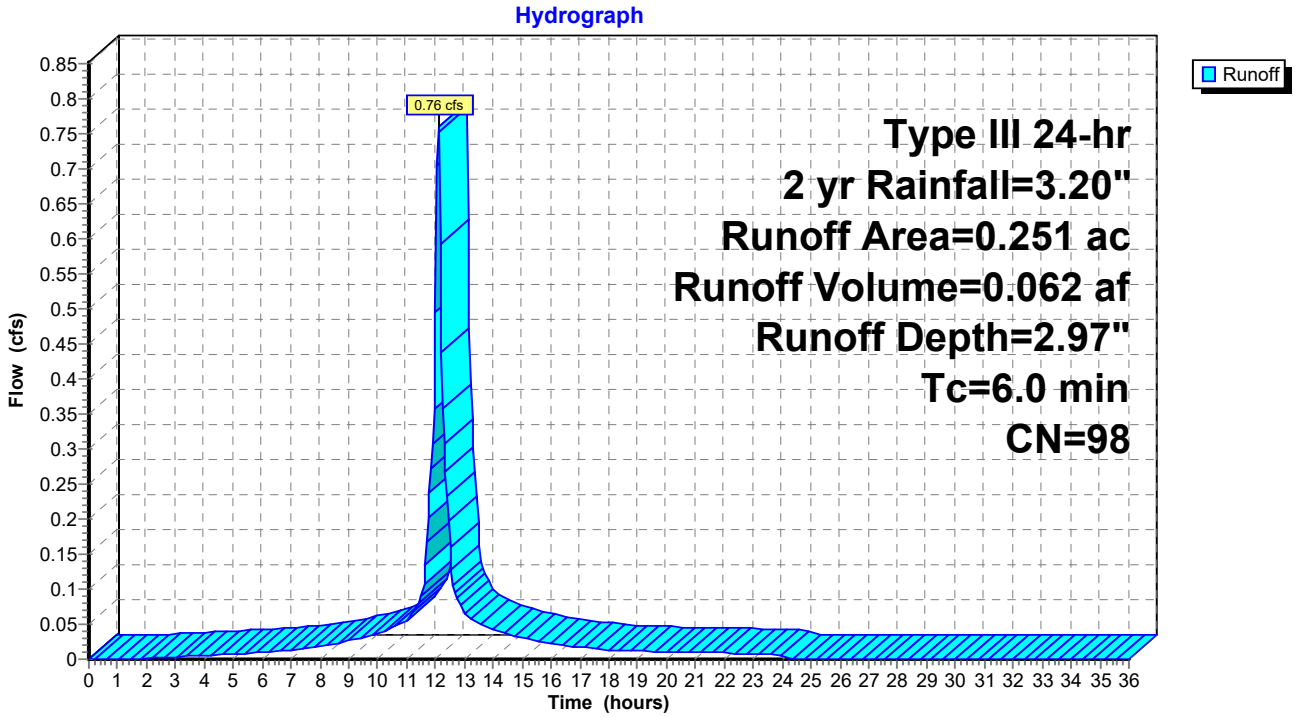
Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.062 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.251	98	Roofs, HSG B
0.251		100.00% Impervious Area

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

Subcatchment PR-2A: PR-2B



Summary for Subcatchment PR-3A: PR-3A

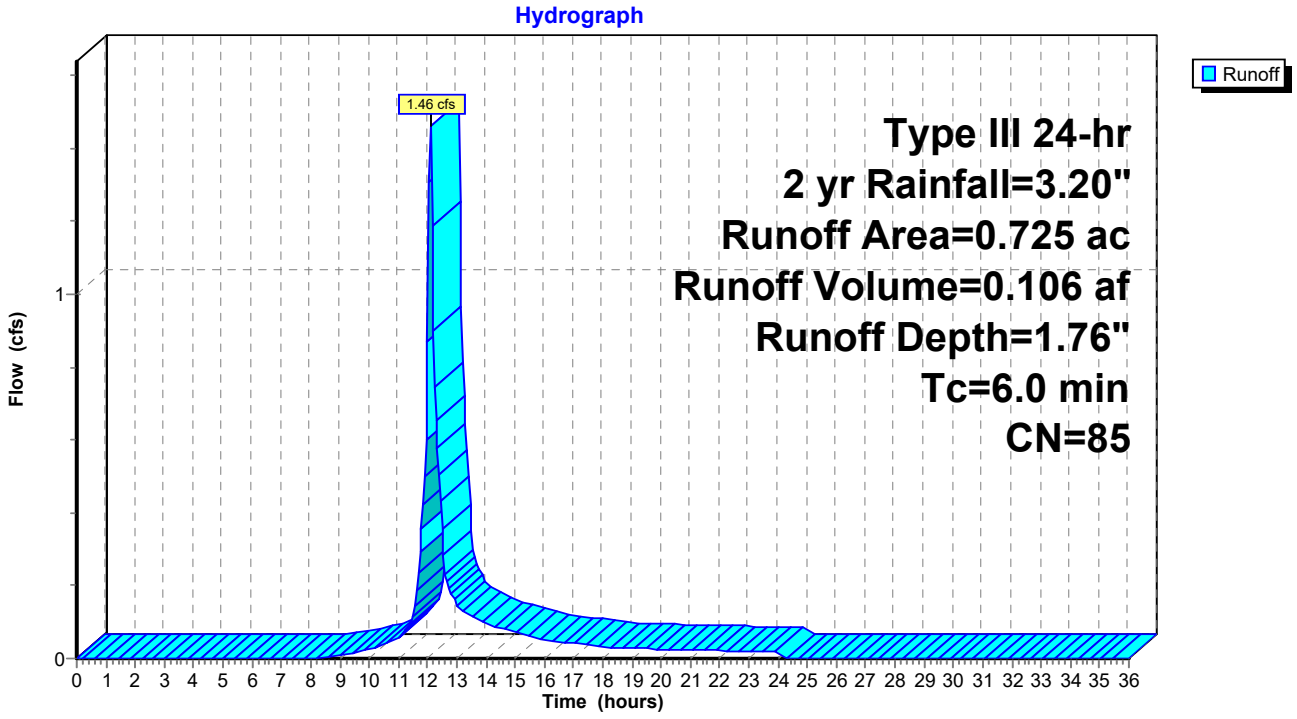
Runoff = 1.46 cfs @ 12.09 hrs, Volume= 0.106 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.249	61	>75% Grass cover, Good, HSG B
0.476	98	Paved parking, HSG B
0.725	85	Weighted Average
0.249		34.34% Pervious Area
0.476		65.66% Impervious Area

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

Subcatchment PR-3A: PR-3A



Summary for Subcatchment PR-3B: PR-3B

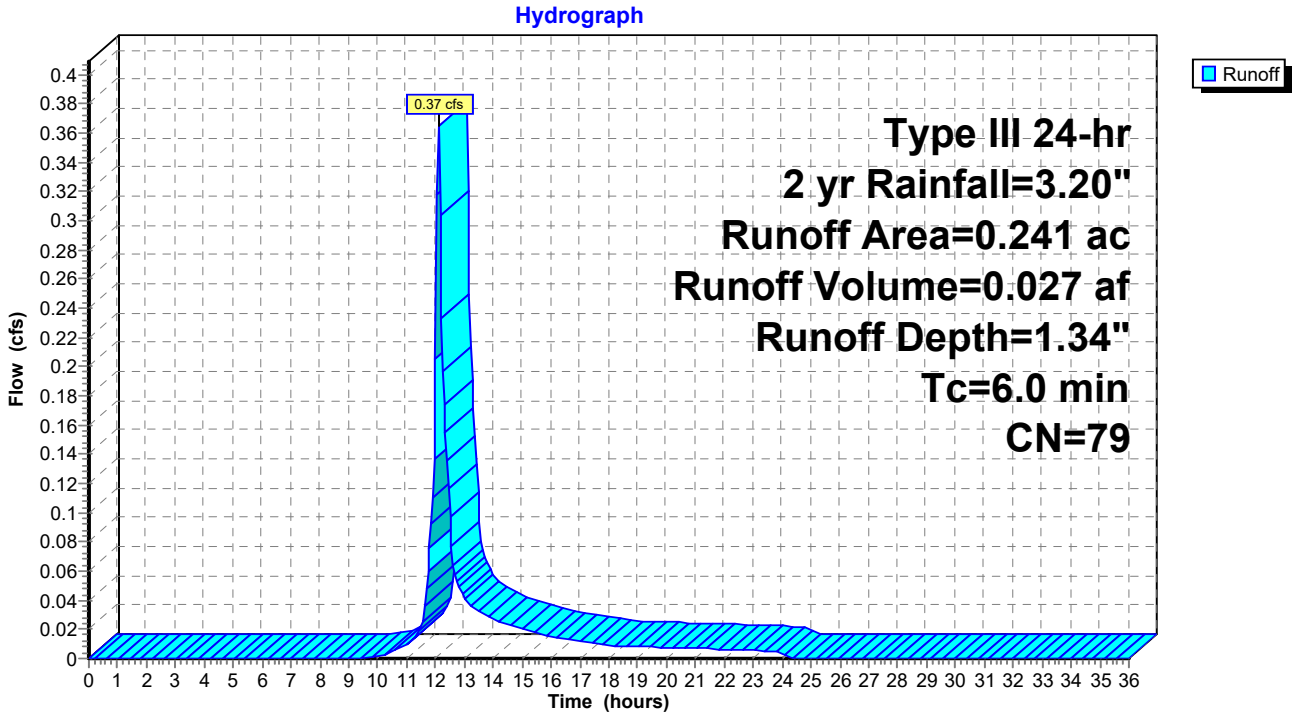
Runoff = 0.37 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.124	61	>75% Grass cover, Good, HSG B
0.117	98	Paved parking, HSG B
0.241	79	Weighted Average
0.124		51.45% Pervious Area
0.117		48.55% Impervious Area

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

Subcatchment PR-3B: PR-3B



Summary for Subcatchment PR-3C: PR-3C

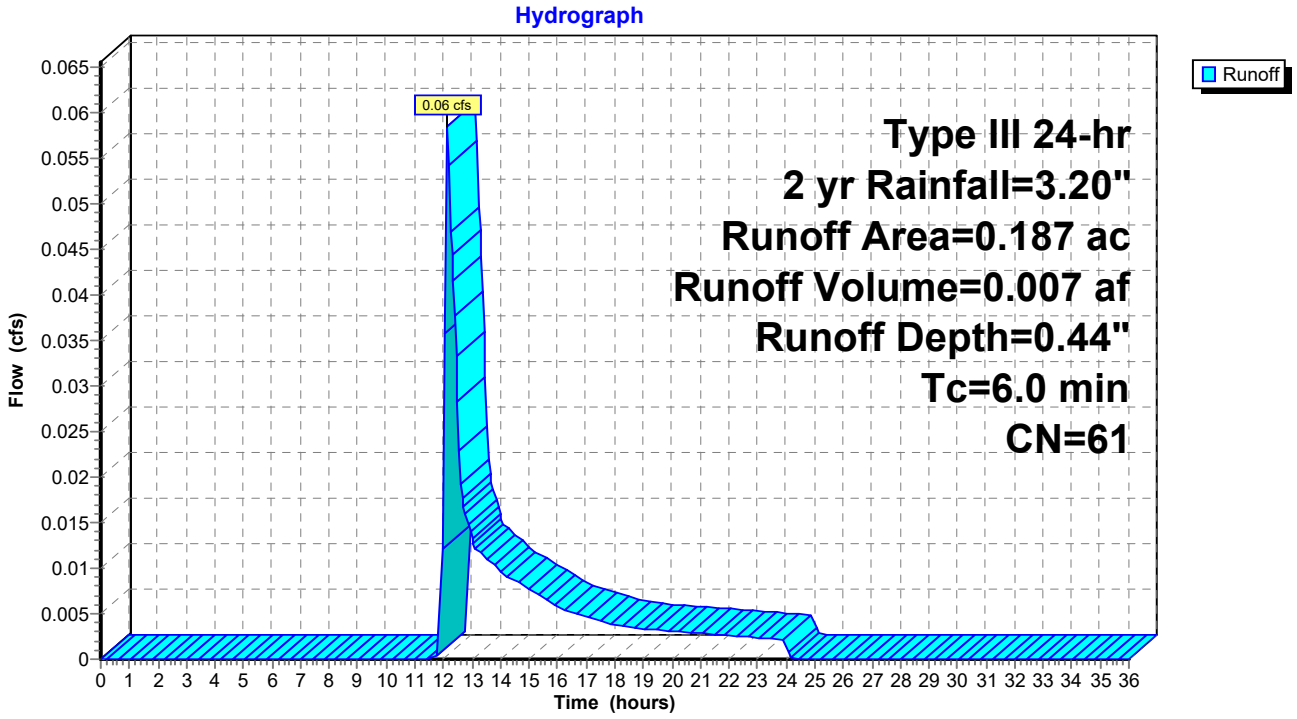
Runoff = 0.06 cfs @ 12.13 hrs, Volume= 0.007 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Description
0.187	61	>75% Grass cover, Good, HSG B
0.187		100.00% Pervious Area

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

Subcatchment PR-3C: PR-3C



Summary for Subcatchment PR-4A: PR-5A

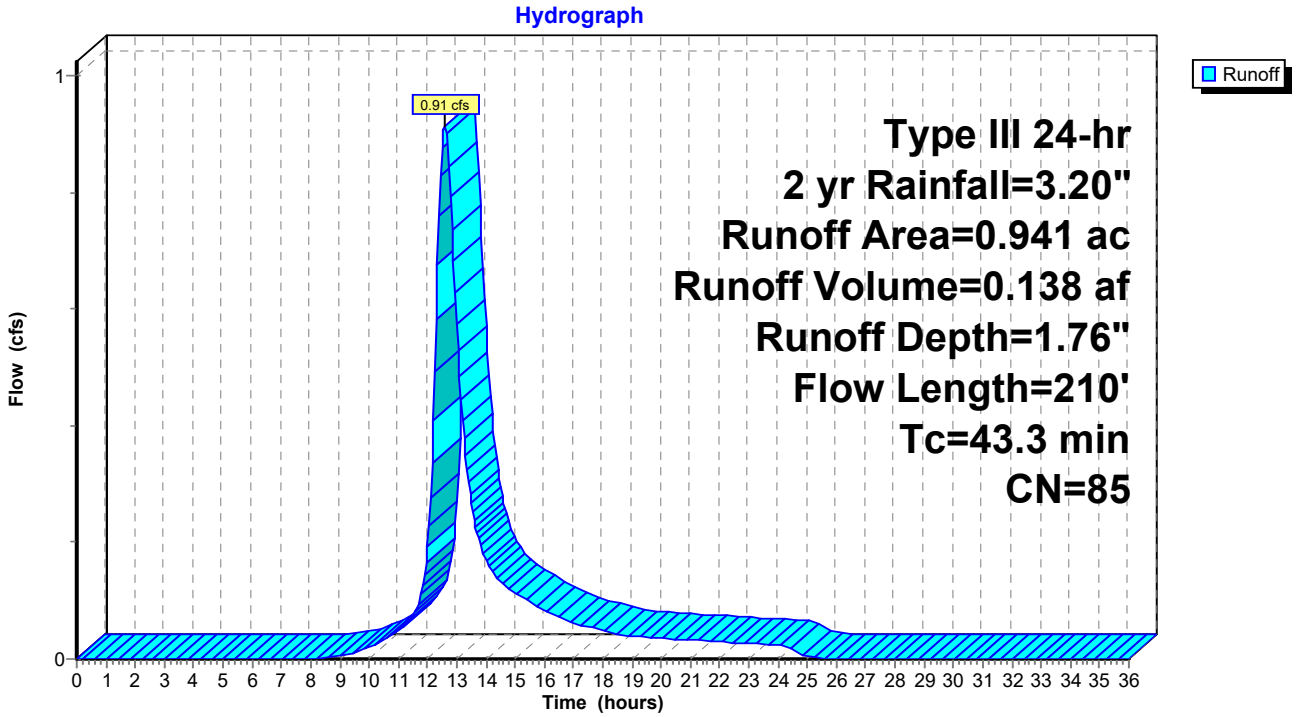
Runoff = 0.91 cfs @ 12.60 hrs, Volume= 0.138 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (ac)	CN	Description
*	0.941	85	SYNTHETIC TURF- PAD- LINER
	0.941		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	110	0.0055	0.05		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
43.3	210	Total			

Subcatchment PR-4A: PR-5A



Summary for Subcatchment PR-4B: SB 11 A

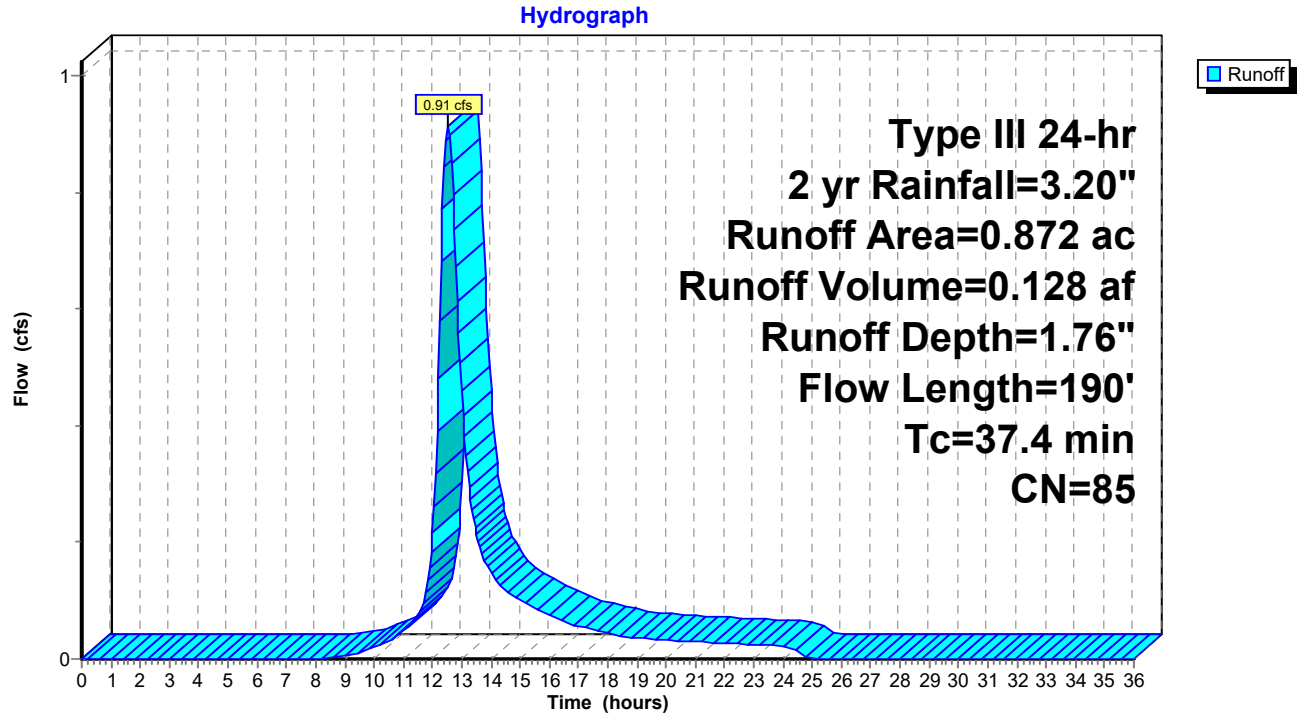
Runoff = 0.91 cfs @ 12.52 hrs, Volume= 0.128 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (ac)	CN	Description
*	0.872	85	SYNTHETIC TURF- PAD- LINER
	0.872		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	90	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
37.4	190	Total			

Subcatchment PR-4B: SB 11 A



Summary for Subcatchment PR-4C: SB 00 DPW SLOPE

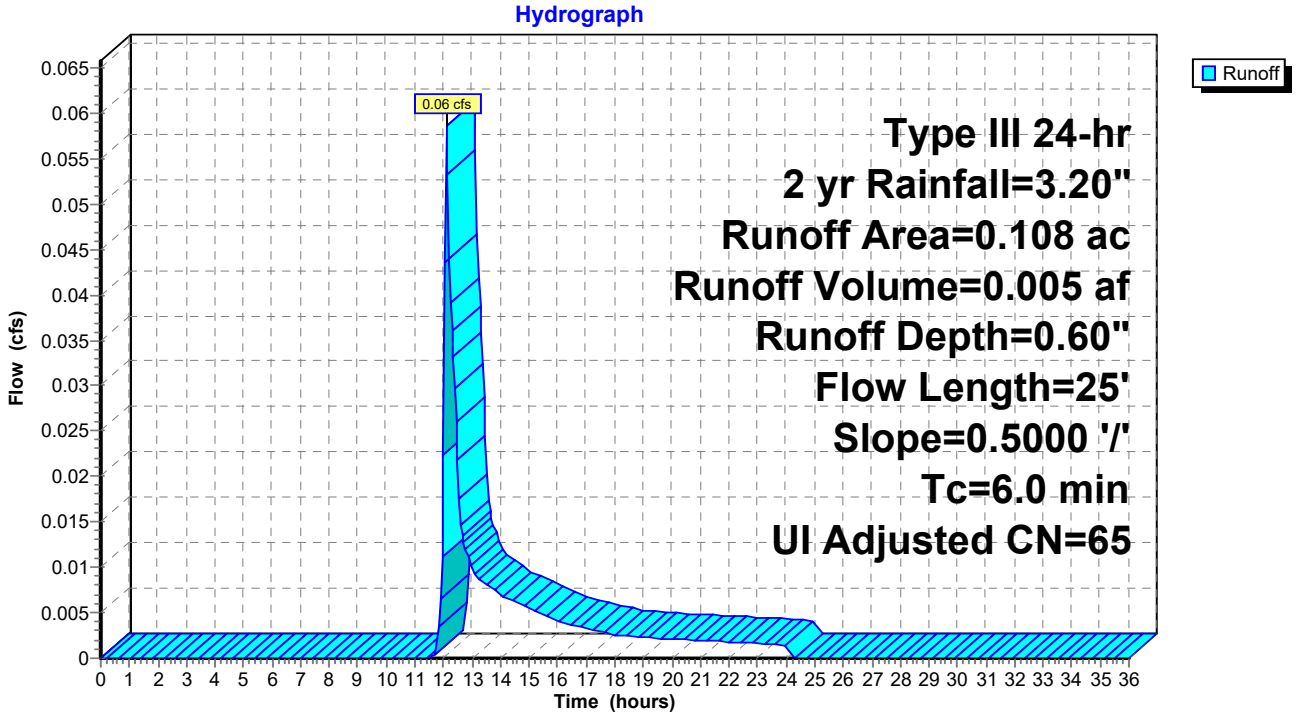
Runoff = 0.06 cfs @ 12.11 hrs, Volume= 0.005 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (ac)	CN	Adj	Description
0.025	98		Unconnected pavement, HSG B
0.083	61		>75% Grass cover, Good, HSG B
0.108	70	65	Weighted Average, UI Adjusted
0.083			76.85% Pervious Area
0.025			23.15% Impervious Area
0.025			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	25	0.5000	0.32		**Sheet Flow, SLOPING LAND** Grass: Dense n= 0.240 P2= 3.20"
1.3	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-4C: SB 00 DPW SLOPE



Summary for Subcatchment PR-5A: BB 01 A

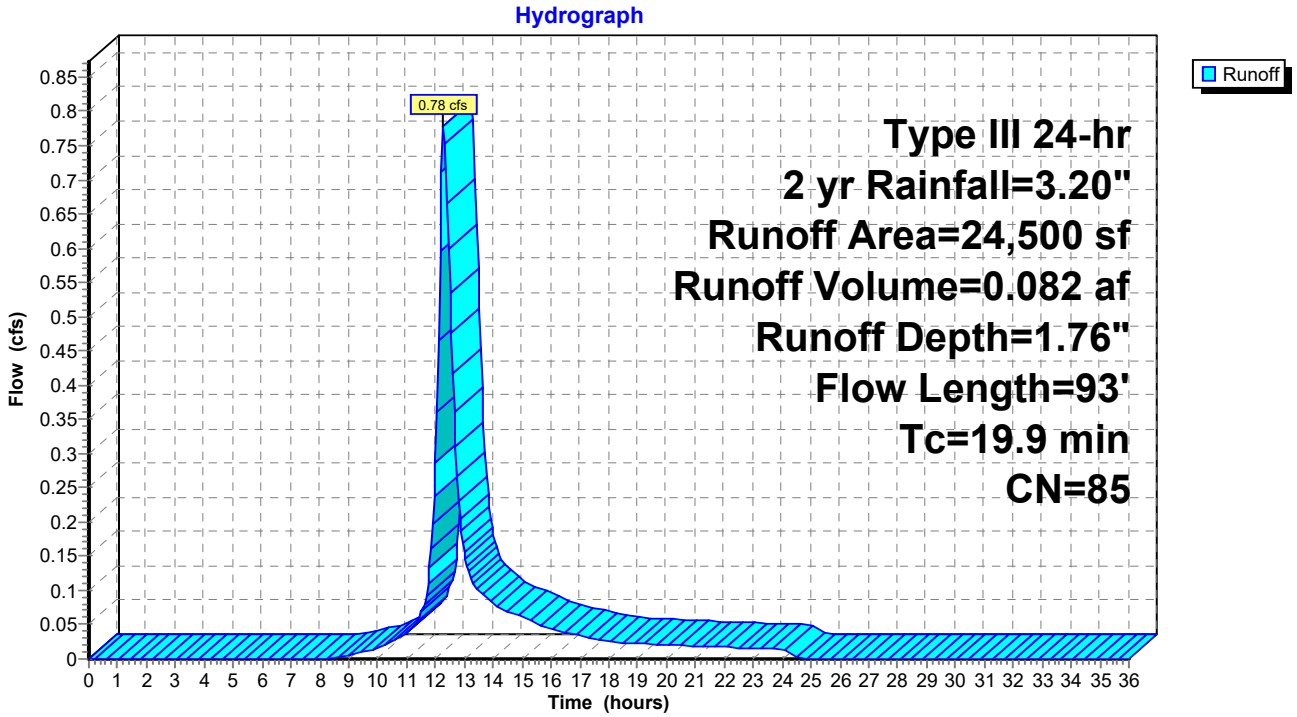
Runoff = 0.78 cfs @ 12.28 hrs, Volume= 0.082 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	24,500	85	SYNTHETIC TURF- PAD- LINER
	24,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	46	0.0067	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
19.9	93	Total			

Subcatchment PR-5A: BB 01 A



Summary for Subcatchment PR-5B: BB 11 A

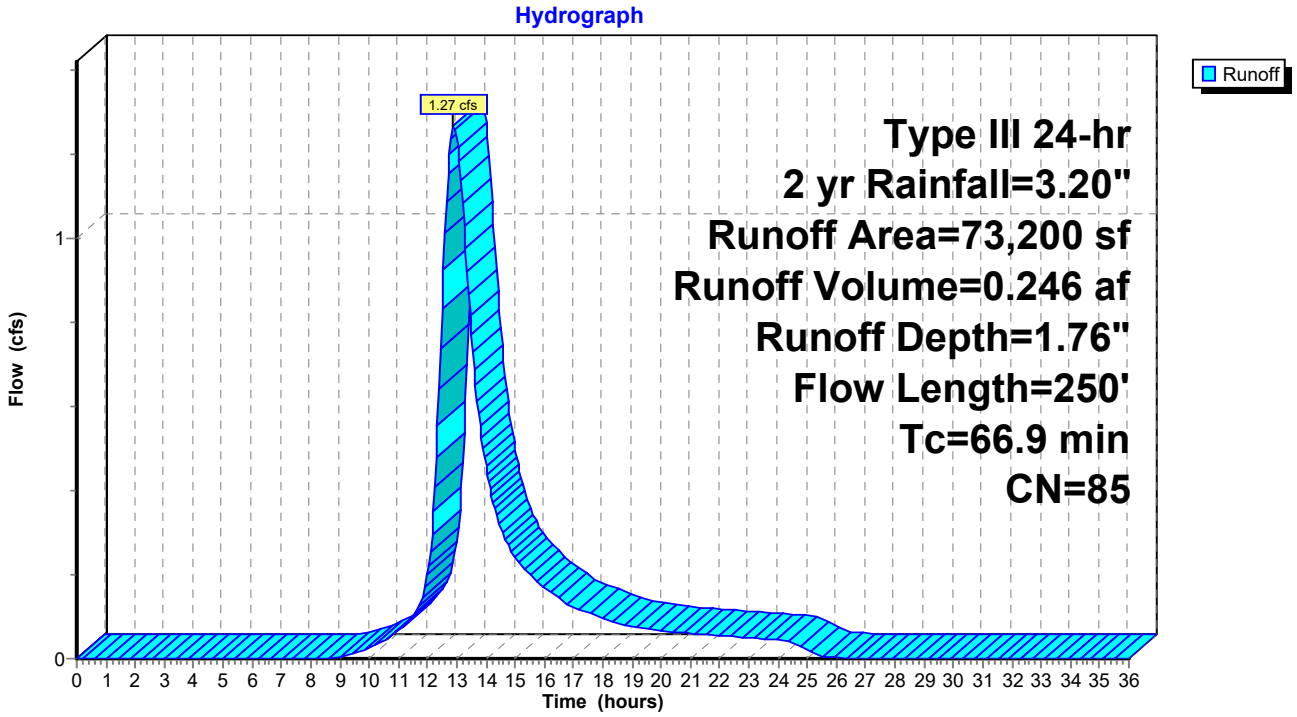
Runoff = 1.27 cfs @ 12.90 hrs, Volume= 0.246 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	73,200	85	SYNTHETIC TURF- PAD- LINER
	73,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	53	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
43.1	150	0.0083	0.06		**Sheet Flow, SYNTHETIC TURF** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
66.9	250	Total			

Subcatchment PR-5B: BB 11 A



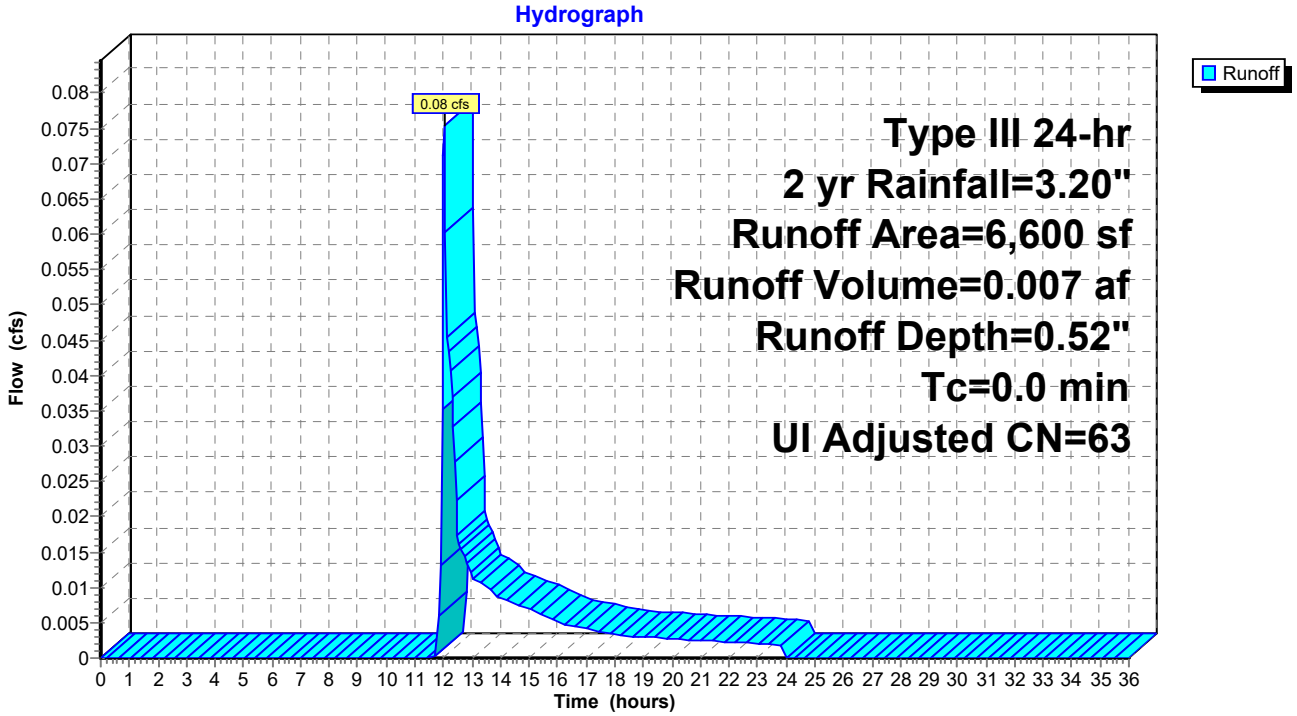
Summary for Subcatchment PR-5C: SLOPE

Runoff = 0.08 cfs @ 12.02 hrs, Volume= 0.007 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Adj	Description
600	98		Unconnected roofs, HSG B
6,000	61		>75% Grass cover, Good, HSG B
6,600	64	63	Weighted Average, UI Adjusted
6,000			90.91% Pervious Area
600			9.09% Impervious Area
600			100.00% Unconnected

Subcatchment PR-5C: SLOPE



Summary for Pond 1P: rain garden#1 cascading

Inflow Area = 0.725 ac, 65.66% Impervious, Inflow Depth = 1.76" for 2 yr event
Inflow = 1.46 cfs @ 12.09 hrs, Volume= 0.106 af
Outflow = 1.44 cfs @ 12.11 hrs, Volume= 0.104 af, Atten= 1%, Lag= 0.9 min
Primary = 1.44 cfs @ 12.11 hrs, Volume= 0.104 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 61.77' @ 12.11 hrs Surf.Area= 441 sf Storage= 442 cf
Flood Elev= 63.00' Surf.Area= 660 sf Storage= 1,132 cf

Plug-Flow detention time= 76.0 min calculated for 0.104 af (98% of inflow)
Center-of-Mass det. time= 66.2 min (892.3 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,048 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 1,348 cf Overall - 300 cf Embedded = 1,048 cf
#2	58.50'	30 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 75 cf Overall x 40.0% Voids
#3	59.00'	50 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 199 cf Overall x 25.0% Voids
#4	60.33'	5 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 26 cf Overall x 20.0% Voids
		1,132 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
60.50	150	300	300
61.00	236	97	397
62.00	503	370	766
63.00	660	582	1,348

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
59.00	150	75	75

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	150	0	0
60.33	150	199	199

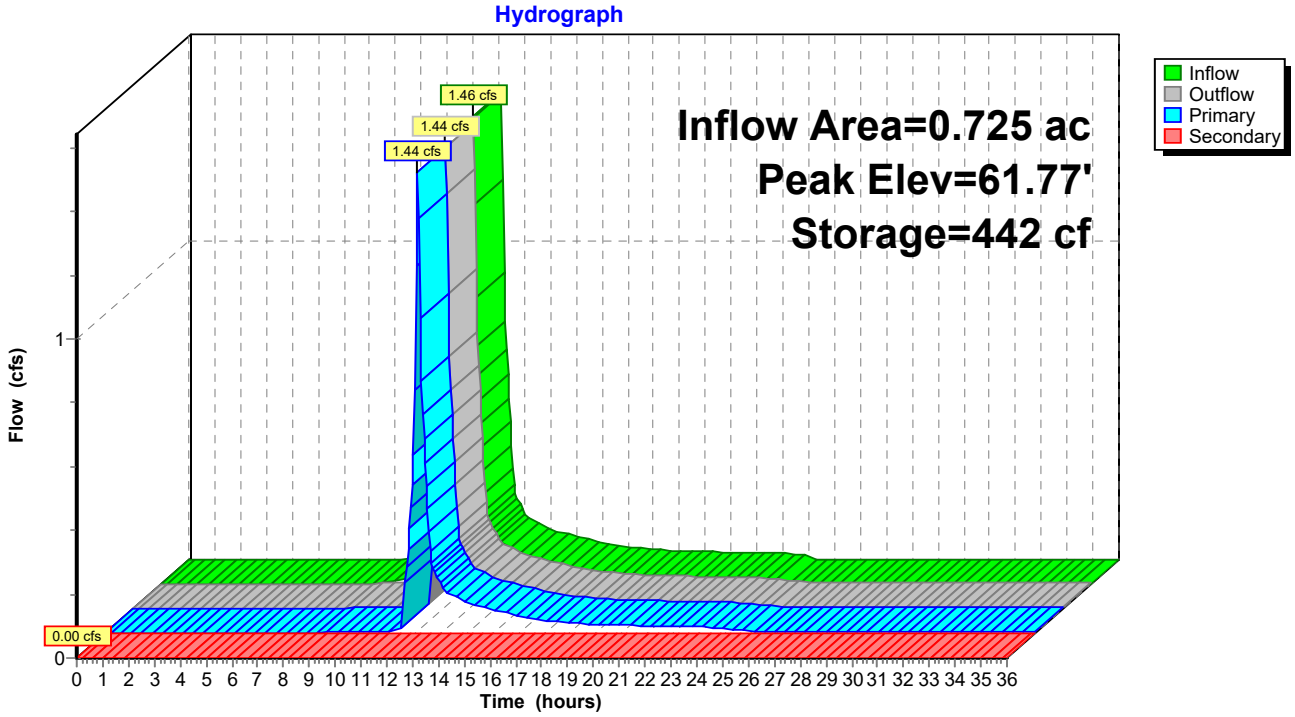
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.33	150	0	0
60.50	150	26	26

Device	Routing	Invert	Outlet Devices
#1	Device 3	58.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	62.00'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	58.50'	**8.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 58.50' / 58.40' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#4	Device 3	61.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.41 cfs @ 12.11 hrs HW=61.77' TW=54.04' (Dynamic Tailwater)
└─**3=Culvert** (Passes 1.41 cfs of 2.88 cfs potential flow)
  └─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**4=Orifice/Grate** (Weir Controls 1.40 cfs @ 1.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' TW=51.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 1P: rain garden#1 cascading



Summary for Pond 2P: rain garden#2 cascading

Inflow Area = 0.966 ac, 61.39% Impervious, Inflow Depth > 1.63" for 2 yr event
Inflow = 1.81 cfs @ 12.11 hrs, Volume= 0.131 af
Outflow = 1.72 cfs @ 12.13 hrs, Volume= 0.124 af, Atten= 5%, Lag= 1.7 min
Primary = 1.72 cfs @ 12.13 hrs, Volume= 0.124 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 54.05' @ 12.13 hrs Surf.Area= 727 sf Storage= 811 cf
Flood Elev= 55.00' Surf.Area= 1,326 sf Storage= 1,784 cf

Plug-Flow detention time= 120.1 min calculated for 0.124 af (94% of inflow)
Center-of-Mass det. time= 74.7 min (957.5 - 882.8)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	1,557 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 2,357 cf Overall - 800 cf Embedded = 1,557 cf
#2	51.00'	80 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 200 cf Overall x 40.0% Voids
#3	51.50'	133 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 532 cf Overall x 25.0% Voids
#4	52.83'	14 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 68 cf Overall x 20.0% Voids
		1,784 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
53.00	400	800	800
54.00	694	547	1,347
55.00	1,326	1,010	2,357

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
51.50	400	200	200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	400	0	0
52.83	400	532	532

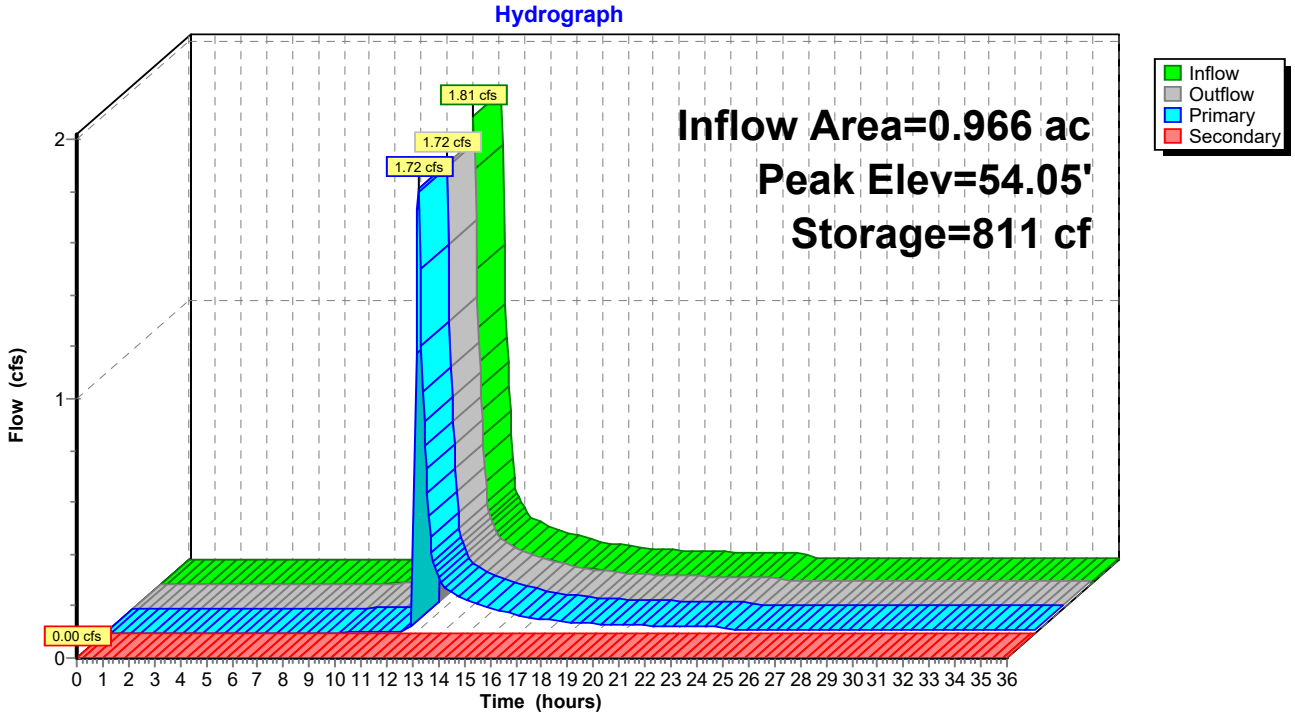
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
52.83	400	0	0
53.00	400	68	68

Device	Routing	Invert	Outlet Devices
#1	Device 3	51.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	54.50'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	51.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 51.00' / 50.88' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#4	Device 3	53.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.68 cfs @ 12.13 hrs HW=54.05' TW=48.39' (Dynamic Tailwater)
└─**3=Culvert** (Passes 1.68 cfs of 6.04 cfs potential flow)
  ├─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)
  └─**4=Orifice/Grate** (Weir Controls 1.67 cfs @ 1.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.00' TW=46.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 2P: rain garden#2 cascading



Summary for Pond 3P: rain garden#3 cascading

Inflow Area = 1.153 ac, 51.43% Impervious, Inflow Depth > 1.36" for 2 yr event
Inflow = 1.78 cfs @ 12.13 hrs, Volume= 0.131 af
Outflow = 1.51 cfs @ 12.26 hrs, Volume= 0.117 af, Atten= 15%, Lag= 7.3 min
Primary = 1.51 cfs @ 12.26 hrs, Volume= 0.117 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.86' @ 12.26 hrs Surf.Area= 908 sf Storage= 991 cf
Flood Elev= 50.00' Surf.Area= 1,373 sf Storage= 2,283 cf

Plug-Flow detention time= 183.6 min calculated for 0.116 af (89% of inflow)
Center-of-Mass det. time= 87.4 min (1,042.7 - 955.3)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	1,944 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 3,144 cf Overall - 1,200 cf Embedded = 1,944 cf
#2	46.00'	120 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 300 cf Overall x 40.0% Voids
#3	46.50'	199 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 798 cf Overall x 25.0% Voids
#4	47.83'	20 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 102 cf Overall x 20.0% Voids
		2,283 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
48.00	600	1,200	1,200
49.00	957	779	1,979
50.00	1,373	1,165	3,144

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
46.50	600	300	300

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.50	600	0	0
47.83	600	798	798

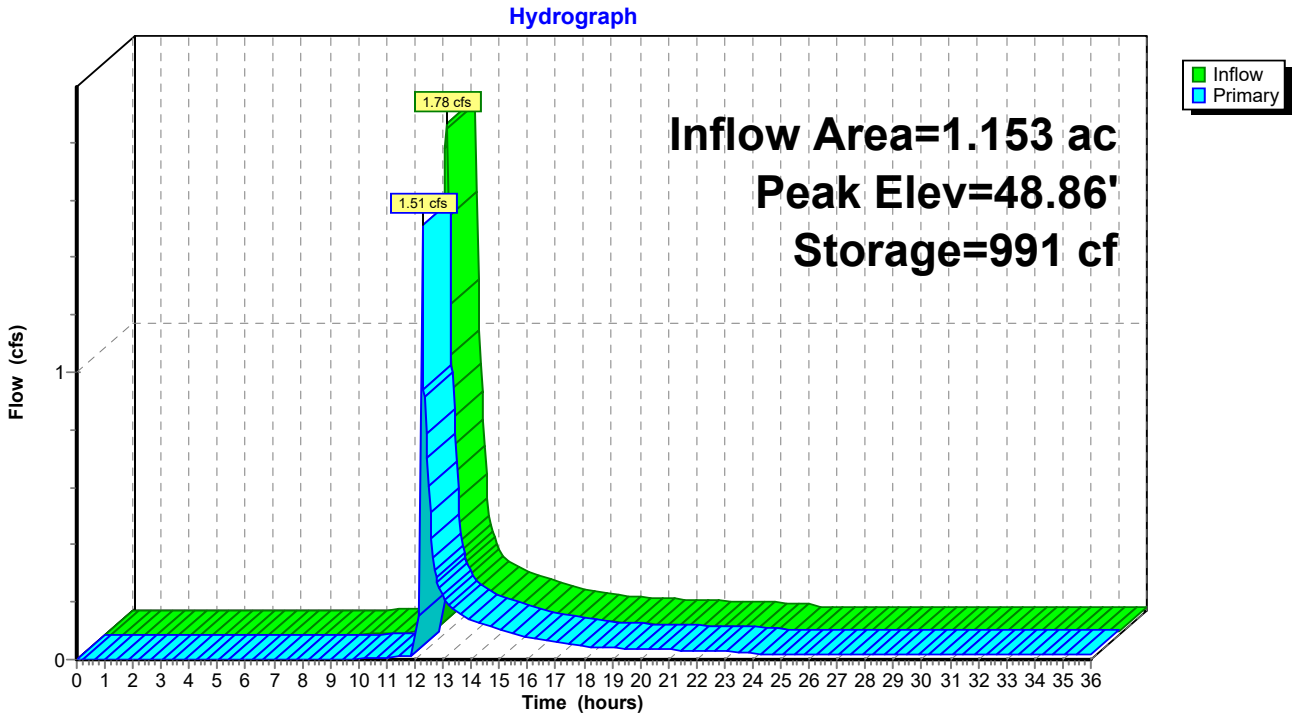
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.83	600	0	0
48.00	600	102	102

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	48.75'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#3 Primary 46.00' **15.0" Round Culvert**
L= 26.0' CPP, projecting, no headwall, Ke= 0.900
Inlet / Outlet Invert= 46.00' / 45.87' S= 0.0050 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.43 cfs @ 12.26 hrs HW=48.86' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 1.43 cfs of 6.97 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)
└**2=Orifice/Grate** (Weir Controls 1.40 cfs @ 1.08 fps)

Pond 3P: rain garden#3 cascading



Summary for Pond 4P: UGS-1

Inflow Area = 1.685 ac, 60.12% Impervious, Inflow Depth = 1.69" for 2 yr event
Inflow = 3.17 cfs @ 12.09 hrs, Volume= 0.238 af
Outflow = 1.96 cfs @ 12.22 hrs, Volume= 0.218 af, Atten= 38%, Lag= 7.6 min
Discarded = 0.04 cfs @ 10.25 hrs, Volume= 0.094 af
Primary = 1.92 cfs @ 12.22 hrs, Volume= 0.124 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 42.31' @ 12.22 hrs Surf.Area= 1,672 sf Storage= 3,125 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 212.8 min (1,030.7 - 817.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.50'	2,099 cf	**29.92'W x 55.89'L x 5.50'H Field A** 9,196 cf Overall - 3,198 cf Embedded = 5,998 cf x 35.0% Voids
#2A	40.25'	3,198 cf	**ADS_StormTech MC-3500 d +Cap** x 28 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 28 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		5,297 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	39.50'	**24.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 39.50' / 39.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	43.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	39.50'	**1.020 in/hr Exfiltration over Surface area**
#4	Device 1	41.83'	**8.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 10.25 hrs HW=39.56' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.84 cfs @ 12.22 hrs HW=42.30' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.84 cfs of 20.16 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.84 cfs @ 2.33 fps)

Pond 4P: UGS-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

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

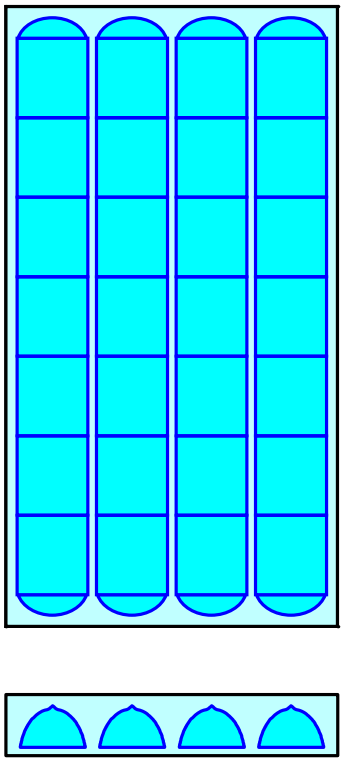
7 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 53.89' Row Length +12.0" End Stone x 2 = 55.89' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

28 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 3,197.9 cf Chamber Storage

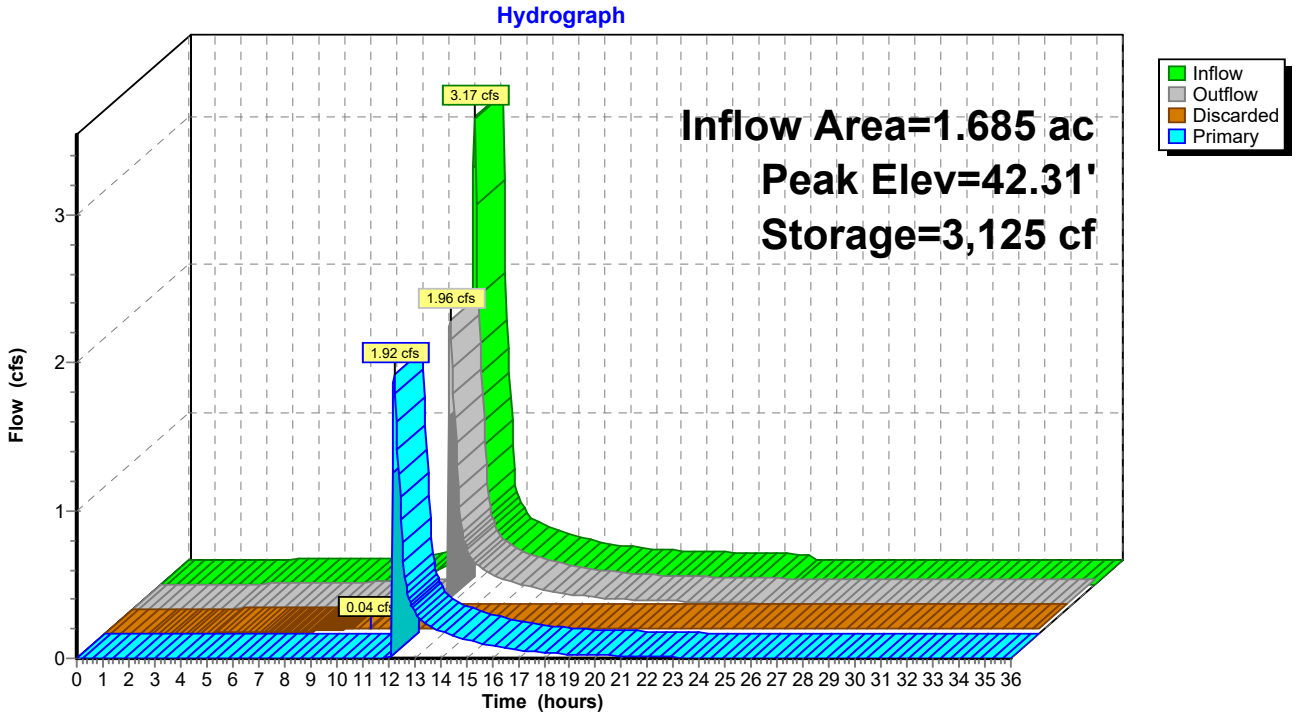
9,196.2 cf Field - 3,197.9 cf Chambers = 5,998.4 cf Stone x 35.0% Voids = 2,099.4 cf Stone Storage

Chamber Storage + Stone Storage = 5,297.3 cf = 0.122 af
Overall Storage Efficiency = 57.6%
Overall System Size = 55.89' x 29.92' x 5.50'

28 Chambers
340.6 cy Field
222.2 cy Stone



Pond 4P: UGS-1


Hydrograph
Inflow Area=1.685 ac
Peak Elev=42.31'
Storage=3,125 cf
3.17 cfs
1.96 cfs
1.92 cfs
0.04 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Time (hours)

Summary for Pond BB 01 B: BB 01 B

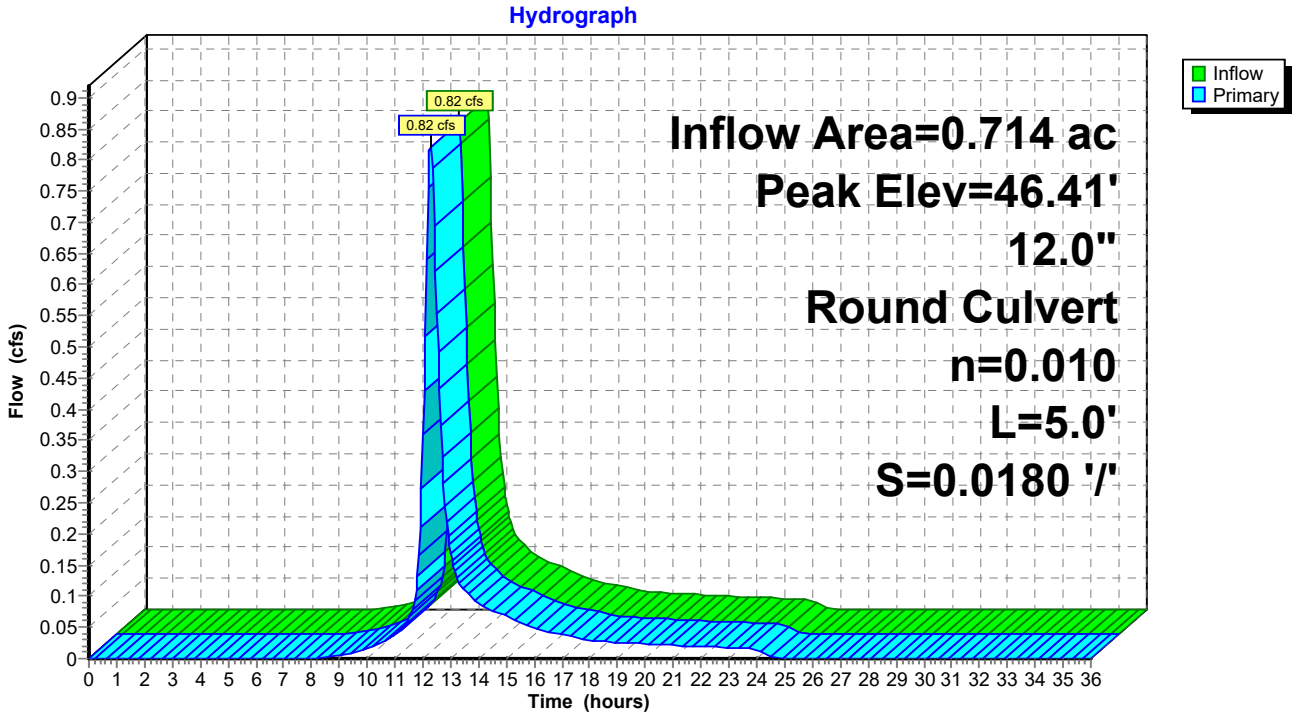
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 1.49" for 2 yr event
Inflow = 0.82 cfs @ 12.27 hrs, Volume= 0.089 af
Outflow = 0.82 cfs @ 12.27 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.27 hrs, Volume= 0.089 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.41' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.81' S= 0.0180 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 12.27 hrs HW=46.41' TW=45.88' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.81 cfs @ 2.94 fps)

Pond BB 01 B: BB 01 B



Summary for Pond BB 01 S: BB 01 S

Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 1.49" for 2 yr event
Inflow = 0.82 cfs @ 12.27 hrs, Volume= 0.089 af
Outflow = 0.38 cfs @ 12.64 hrs, Volume= 0.089 af, Atten= 54%, Lag= 22.3 min
Primary = 0.38 cfs @ 12.64 hrs, Volume= 0.089 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.08' @ 12.65 hrs Surf.Area= 0 sf Storage= 717 cf

Plug-Flow detention time= 13.5 min calculated for 0.089 af (100% of inflow)
Center-of-Mass det. time= 13.1 min (856.5 - 843.4)

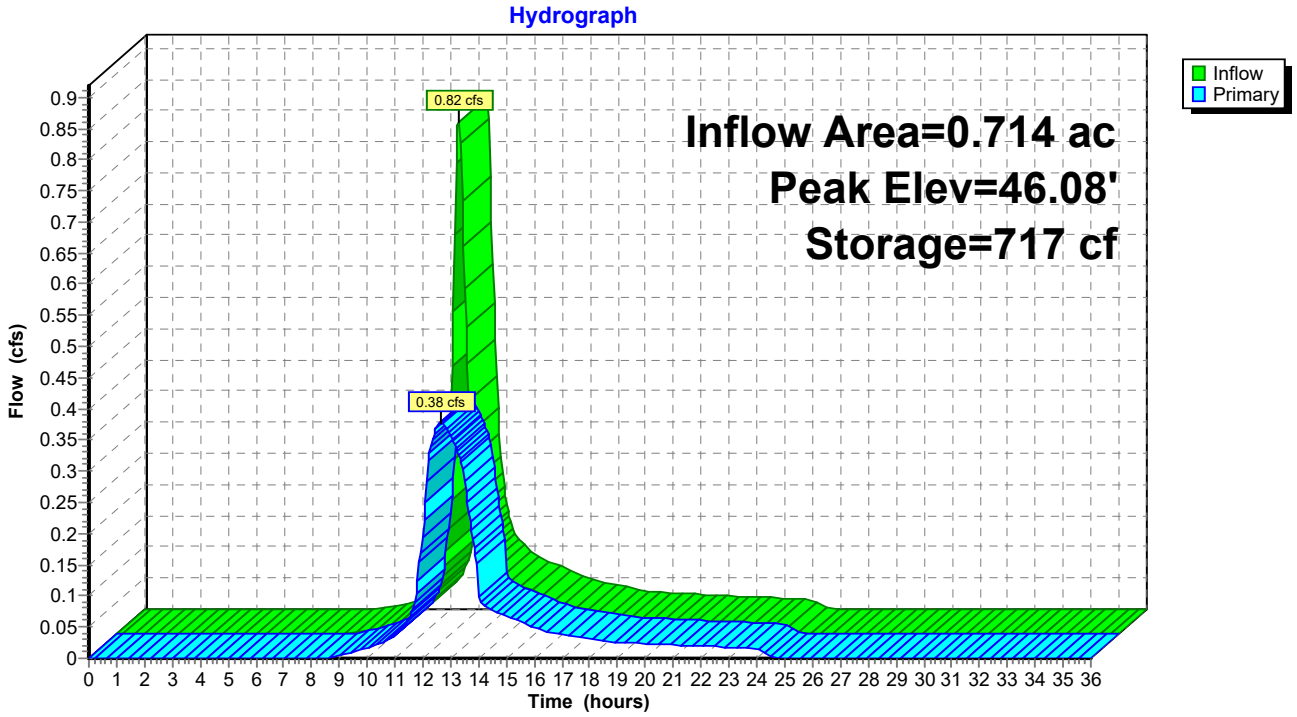
Volume	Invert	Avail.Storage	Storage Description
#1	44.97'	3,256 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.97	0	0
45.30	16	16
45.80	236	252
46.30	825	1,077
46.80	876	1,953
47.30	792	2,745
47.80	511	3,256

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**4.0" Round Culvert** L= 8.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 44.87' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	46.40'	**6.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.30' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Primary OutFlow Max=0.38 cfs @ 12.64 hrs HW=46.08' TW=45.27' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.38 cfs @ 4.33 fps)
2=Culvert (Controls 0.00 cfs)

Pond BB 01 S: BB 01 S



Summary for Pond BB 06 B: BB 06 B

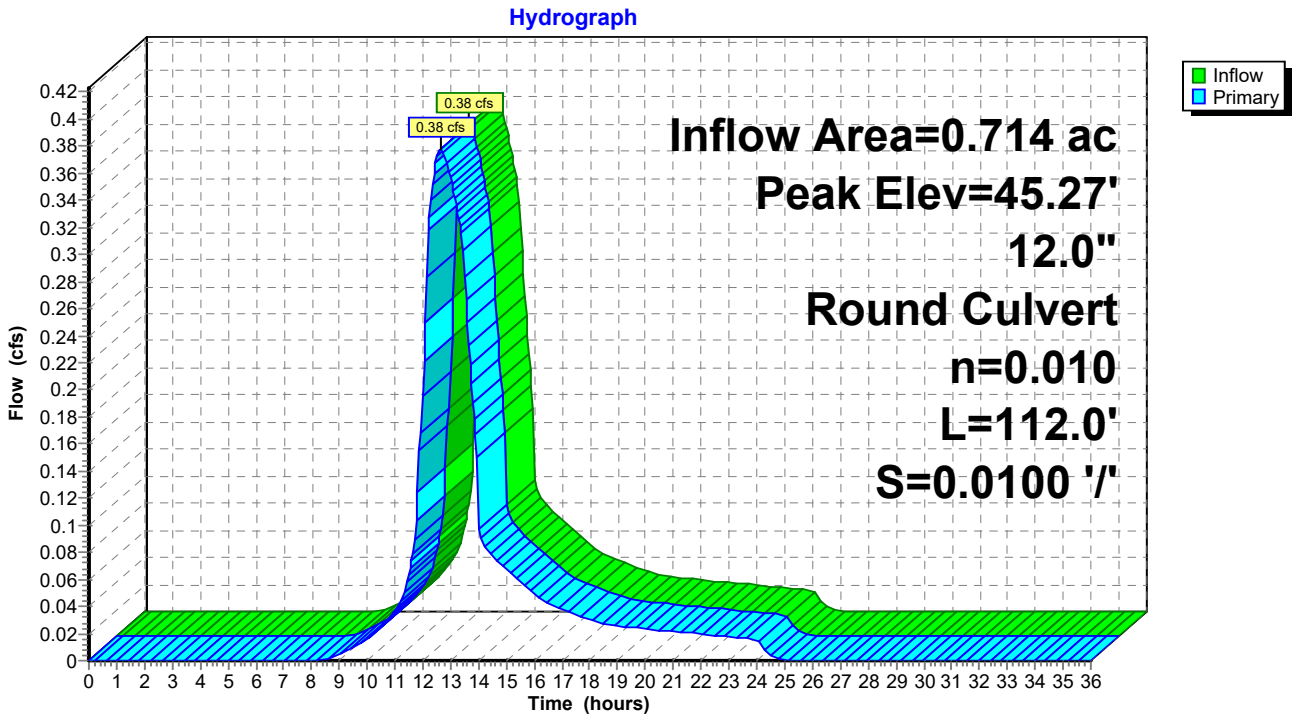
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 1.49" for 2 yr event
Inflow = 0.38 cfs @ 12.64 hrs, Volume= 0.089 af
Outflow = 0.38 cfs @ 12.64 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.64 hrs, Volume= 0.089 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 45.27' @ 12.64 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**12.0" Round Culvert** L= 112.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 43.85' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.64 hrs HW=45.27' TW=43.02' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.38 cfs @ 1.88 fps)

Pond BB 06 B: BB 06 B



Summary for Pond BB 11 B: BB 11 B

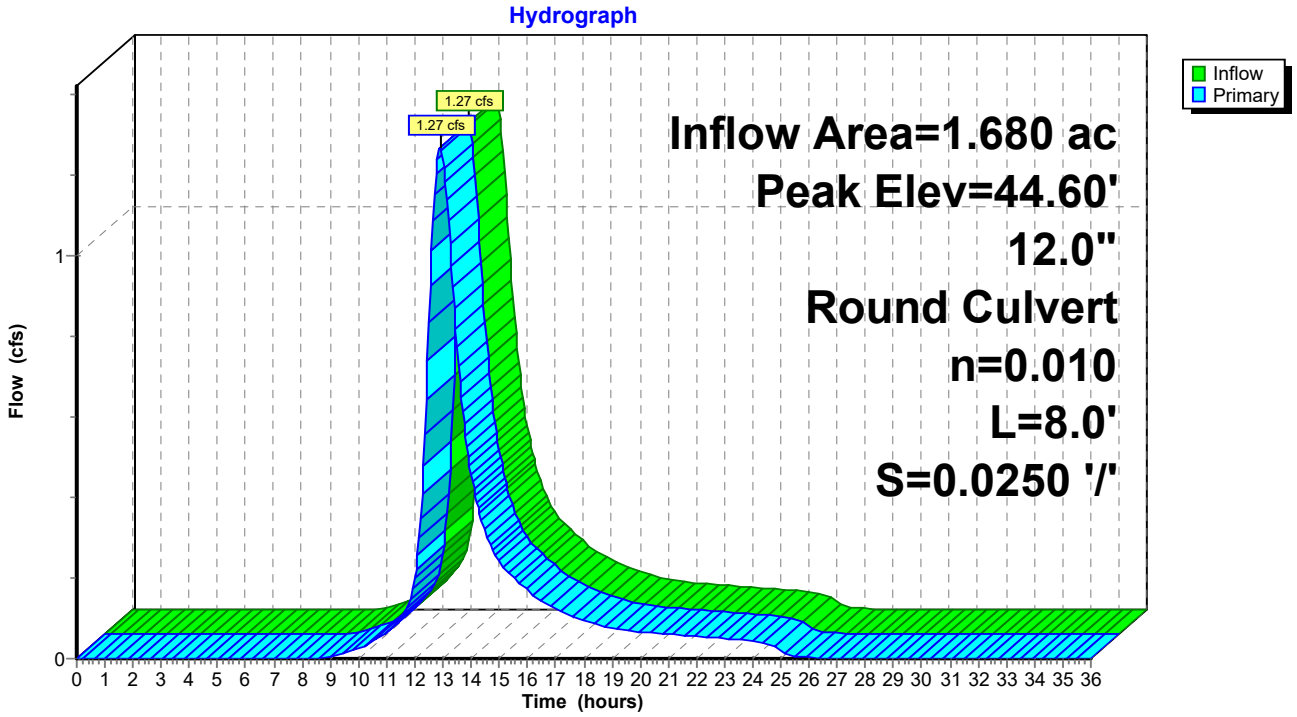
Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 1.76" for 2 yr event
Inflow = 1.27 cfs @ 12.90 hrs, Volume= 0.246 af
Outflow = 1.27 cfs @ 12.90 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.90 hrs, Volume= 0.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 44.60' @ 12.90 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.00'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.00' / 43.80' S= 0.0250 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.27 cfs @ 12.90 hrs HW=44.60' TW=43.67' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.27 cfs @ 3.69 fps)

Pond BB 11 B: BB 11 B



Summary for Pond BB 11 S: BB 11 S

Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 1.76" for 2 yr event
Inflow = 1.27 cfs @ 12.90 hrs, Volume= 0.246 af
Outflow = 1.13 cfs @ 13.16 hrs, Volume= 0.246 af, Atten= 11%, Lag= 15.6 min
Primary = 1.13 cfs @ 13.16 hrs, Volume= 0.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.79' @ 13.16 hrs Surf.Area= 0 sf Storage= 489 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.3 min (884.8 - 882.5)

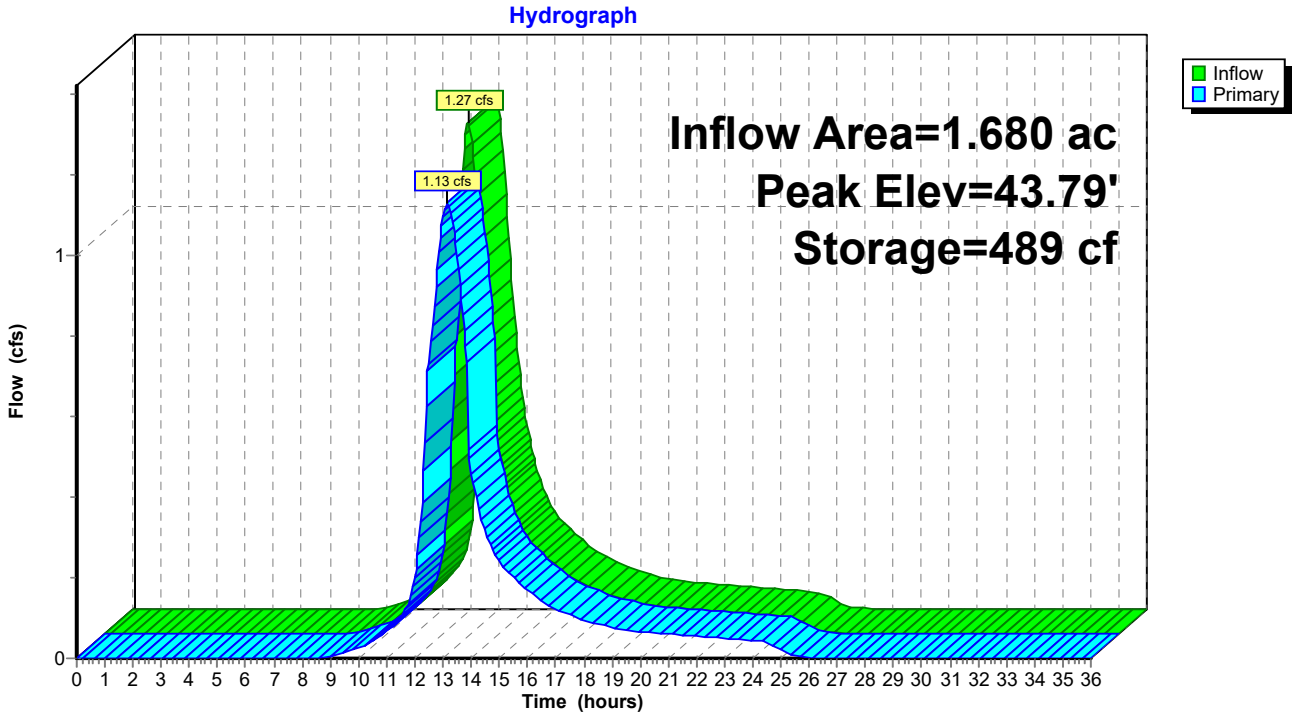
Volume	Invert	Avail.Storage	Storage Description
#1	42.97'	4,778 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.97	0	0
43.30	16	16
43.80	481	497
44.30	963	1,460
44.80	1,019	2,479
45.30	1,085	3,564
45.80	603	4,167
46.30	611	4,778

Device	Routing	Invert	Outlet Devices
#1	Primary	42.97'	**4.0" Round Culvert** L= 16.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.97' / 42.81' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	39.70'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.70' / 39.60' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Primary	44.50'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.50' / 44.40' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.13 cfs @ 13.16 hrs HW=43.79' TW=43.09' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 0.34 cfs @ 3.87 fps)
- **2=Culvert** (Inlet Controls 0.79 cfs @ 4.04 fps)
- **3=Culvert** (Controls 0.00 cfs)

Pond BB 11 S: BB 11 S



Summary for Pond PR-4: PR-4

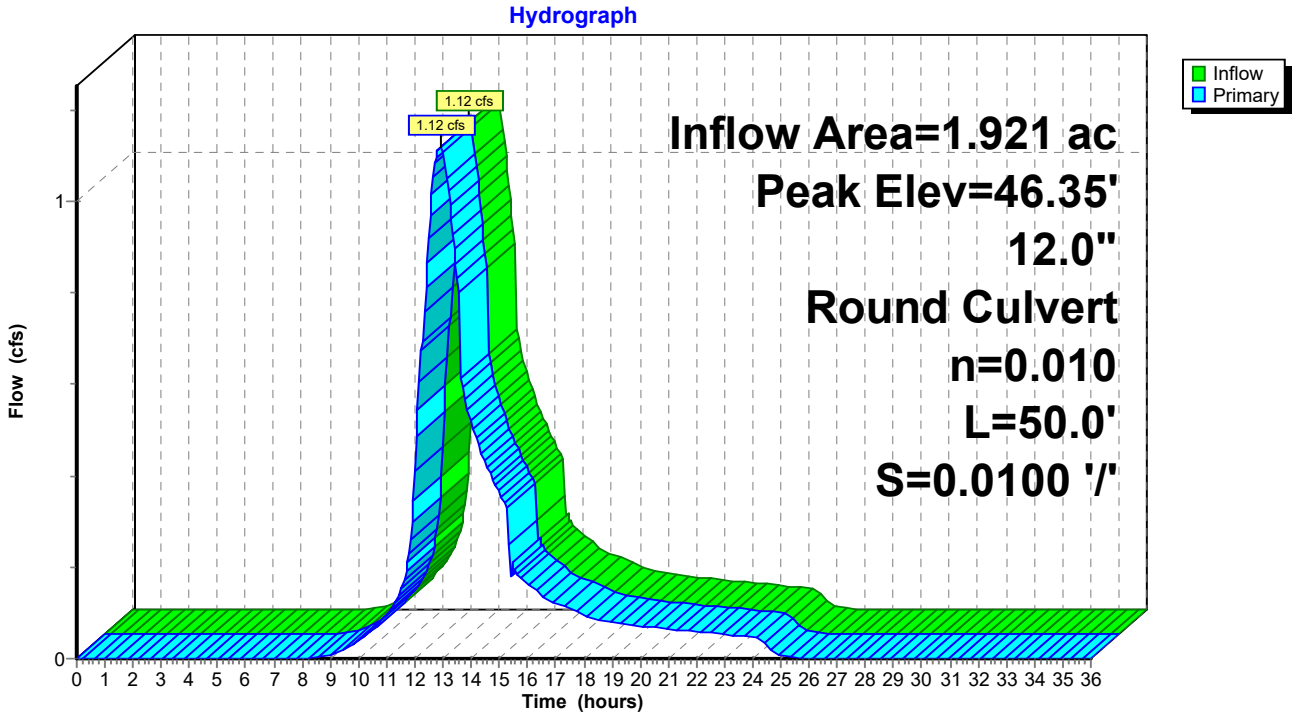
Inflow Area = 1.921 ac, 1.30% Impervious, Inflow Depth = 1.69" for 2 yr event
Inflow = 1.12 cfs @ 12.91 hrs, Volume= 0.271 af
Outflow = 1.12 cfs @ 12.91 hrs, Volume= 0.271 af, Atten= 0%, Lag= 0.0 min
Primary = 1.12 cfs @ 12.91 hrs, Volume= 0.271 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.35' @ 12.91 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.80'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.80' / 45.30' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.12 cfs @ 12.91 hrs HW=46.35' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.12 cfs @ 2.53 fps)

Pond PR-4: PR-4



Summary for Pond PR-5: PR-5

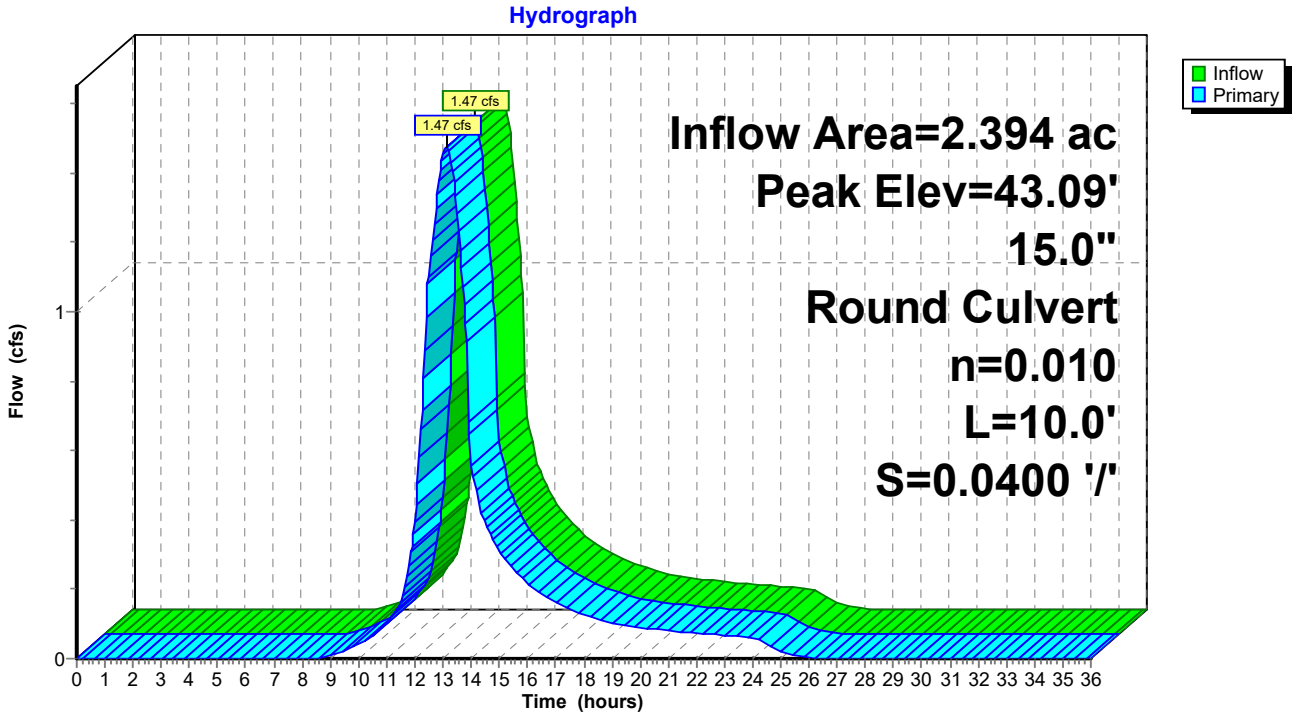
Inflow Area = 2.394 ac, 0.58% Impervious, Inflow Depth = 1.68" for 2 yr event
Inflow = 1.47 cfs @ 13.12 hrs, Volume= 0.335 af
Outflow = 1.47 cfs @ 13.12 hrs, Volume= 0.335 af, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 13.12 hrs, Volume= 0.335 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.09' @ 13.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.50'	**15.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.10' S= 0.0400 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=1.47 cfs @ 13.12 hrs HW=43.09' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.47 cfs @ 2.61 fps)

Pond PR-5: PR-5



Summary for Pond SB 01 B: SB 01 B

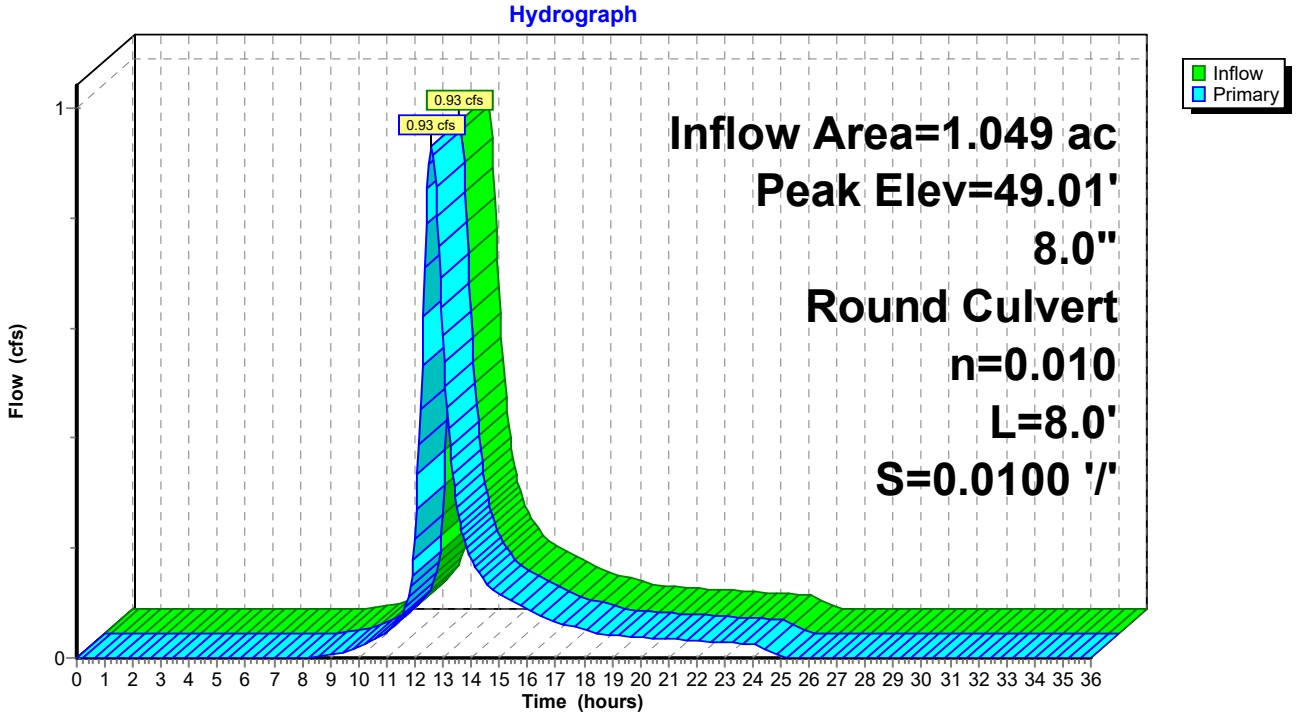
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 1.64" for 2 yr event
Inflow = 0.93 cfs @ 12.59 hrs, Volume= 0.143 af
Outflow = 0.93 cfs @ 12.59 hrs, Volume= 0.143 af, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.59 hrs, Volume= 0.143 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 49.01' @ 12.59 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.93 cfs @ 12.59 hrs HW=49.01' TW=47.19' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 0.93 cfs @ 3.12 fps)

Pond SB 01 B: SB 01 B



Summary for Pond SB 01 S: SB 01 S

Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 1.64" for 2 yr event
Inflow = 0.93 cfs @ 12.59 hrs, Volume= 0.143 af
Outflow = 0.74 cfs @ 12.85 hrs, Volume= 0.143 af, Atten= 21%, Lag= 15.5 min
Primary = 0.74 cfs @ 12.85 hrs, Volume= 0.143 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.33' @ 12.86 hrs Surf.Area= 0 sf Storage= 455 cf

Plug-Flow detention time= 4.0 min calculated for 0.143 af (100% of inflow)
Center-of-Mass det. time= 4.1 min (866.0 - 862.0)

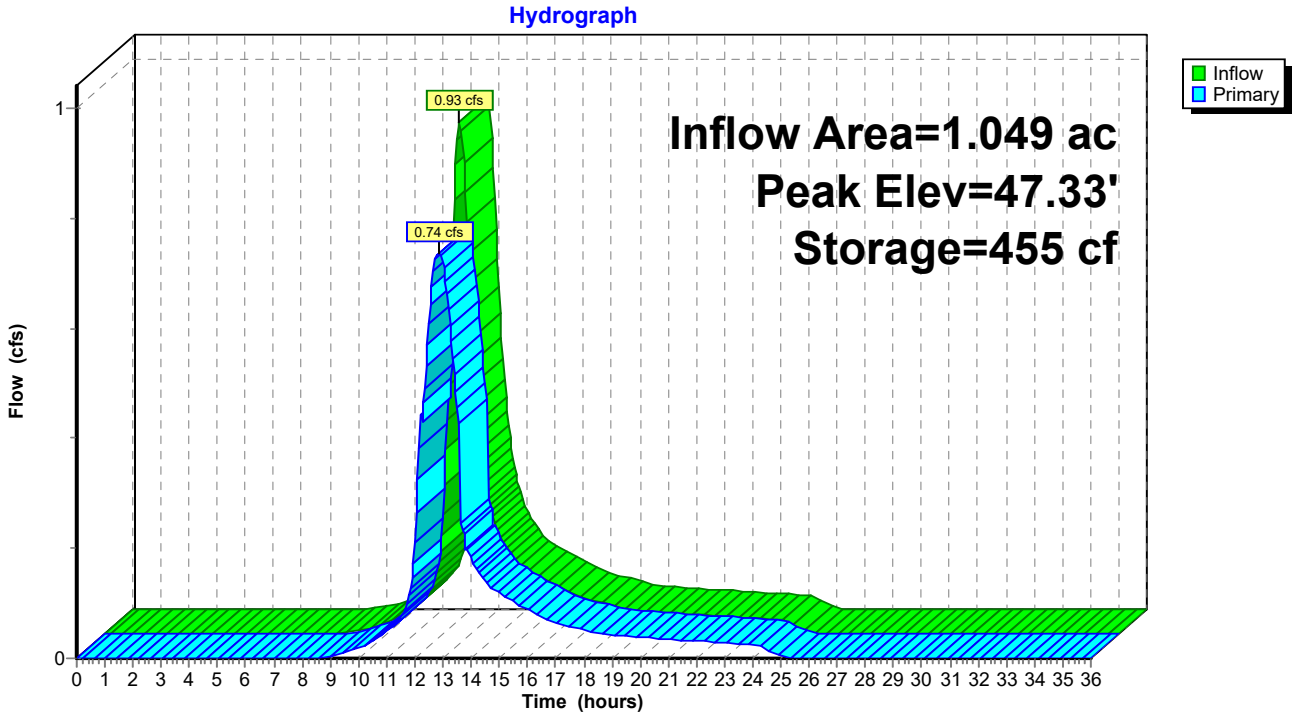
Volume	Invert	Avail.Storage	Storage Description
#1	46.30'	4,121 cf	**Custom Stage Data** Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.30	0	0
46.80	16	16
47.30	386	402
47.80	837	1,239
48.30	886	2,125
48.80	943	3,068
49.30	523	3,591
49.80	530	4,121

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.20' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#2	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.74 cfs @ 12.85 hrs HW=47.33' TW=46.73' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.74 cfs @ 3.74 fps)
2=Culvert (Controls 0.00 cfs)

Pond SB 01 S: SB 01 S



Summary for Pond SB 03 B: SB 03B

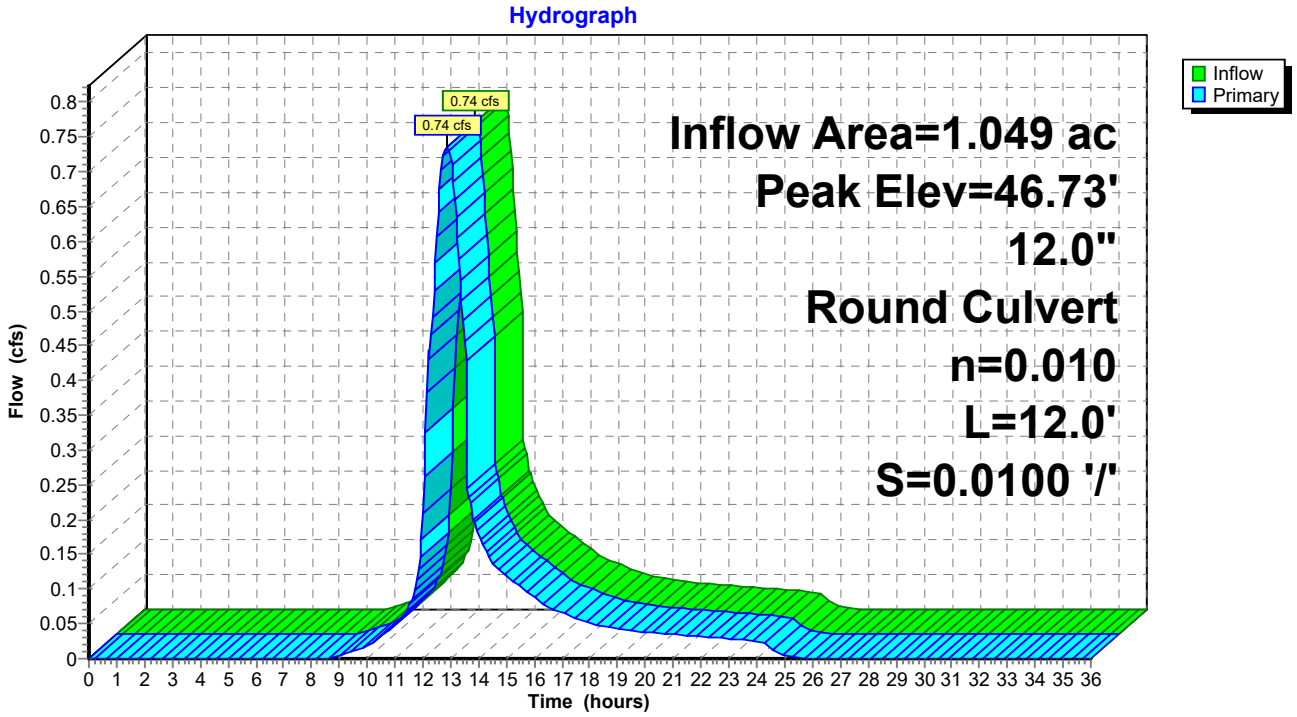
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 1.64" for 2 yr event
Inflow = 0.74 cfs @ 12.85 hrs, Volume= 0.143 af
Outflow = 0.74 cfs @ 12.85 hrs, Volume= 0.143 af, Atten= 0%, Lag= 0.0 min
Primary = 0.74 cfs @ 12.85 hrs, Volume= 0.143 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.73' @ 12.85 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.25'	**12.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.25' / 46.13' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.85 hrs HW=46.73' TW=46.35' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.74 cfs @ 2.92 fps)

Pond SB 03 B: SB 03B



Summary for Pond SB 11 B: SB 11 B

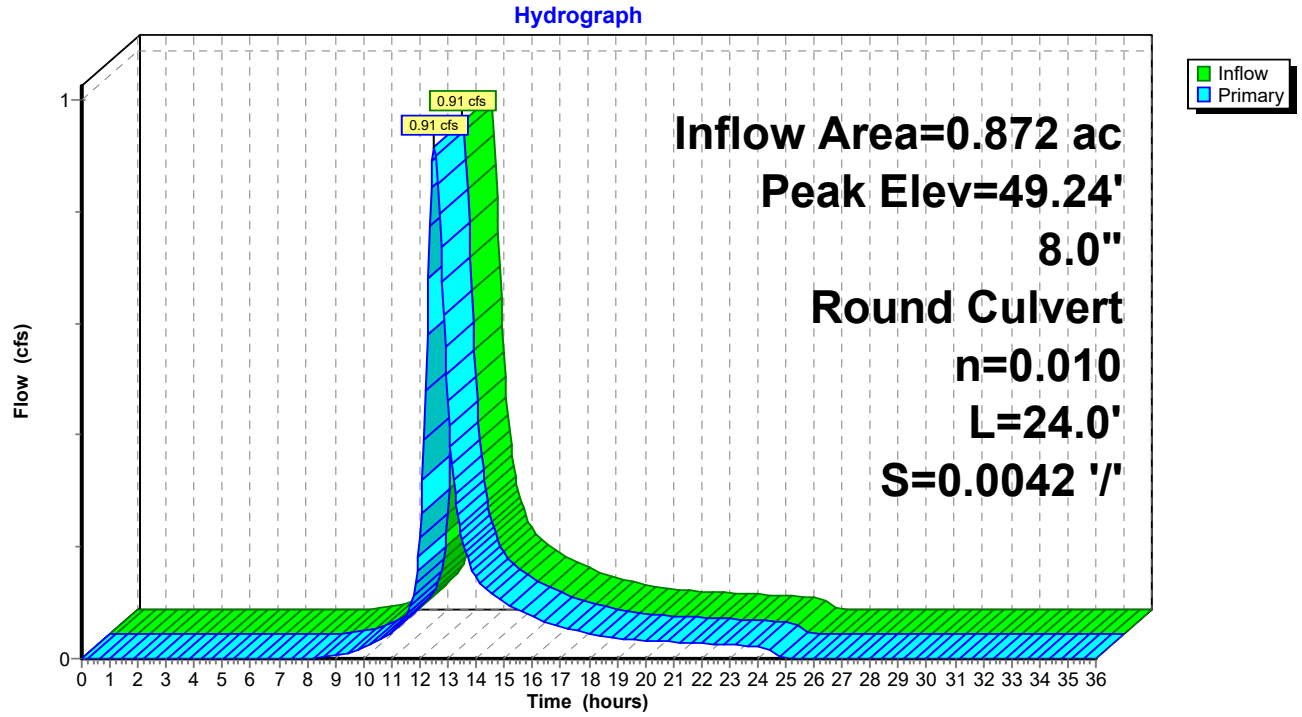
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 1.76" for 2 yr event
Inflow = 0.91 cfs @ 12.52 hrs, Volume= 0.128 af
Outflow = 0.91 cfs @ 12.52 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 0.91 cfs @ 12.52 hrs, Volume= 0.128 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 49.24' @ 12.52 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.50'	**8.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.50' / 48.40' S= 0.0042 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.91 cfs @ 12.52 hrs HW=49.23' TW=47.66' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.91 cfs @ 2.96 fps)

Pond SB 11 B: SB 11 B



Summary for Pond SB 11 S: SB 11 S

Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 1.76" for 2 yr event
Inflow = 0.91 cfs @ 12.52 hrs, Volume= 0.128 af
Outflow = 0.39 cfs @ 13.09 hrs, Volume= 0.128 af, Atten= 57%, Lag= 34.0 min
Primary = 0.39 cfs @ 13.09 hrs, Volume= 0.128 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.99' @ 13.09 hrs Surf.Area= 0 sf Storage= 1,263 cf

Plug-Flow detention time= 24.8 min calculated for 0.128 af (100% of inflow)
Center-of-Mass det. time= 24.4 min (879.6 - 855.2)

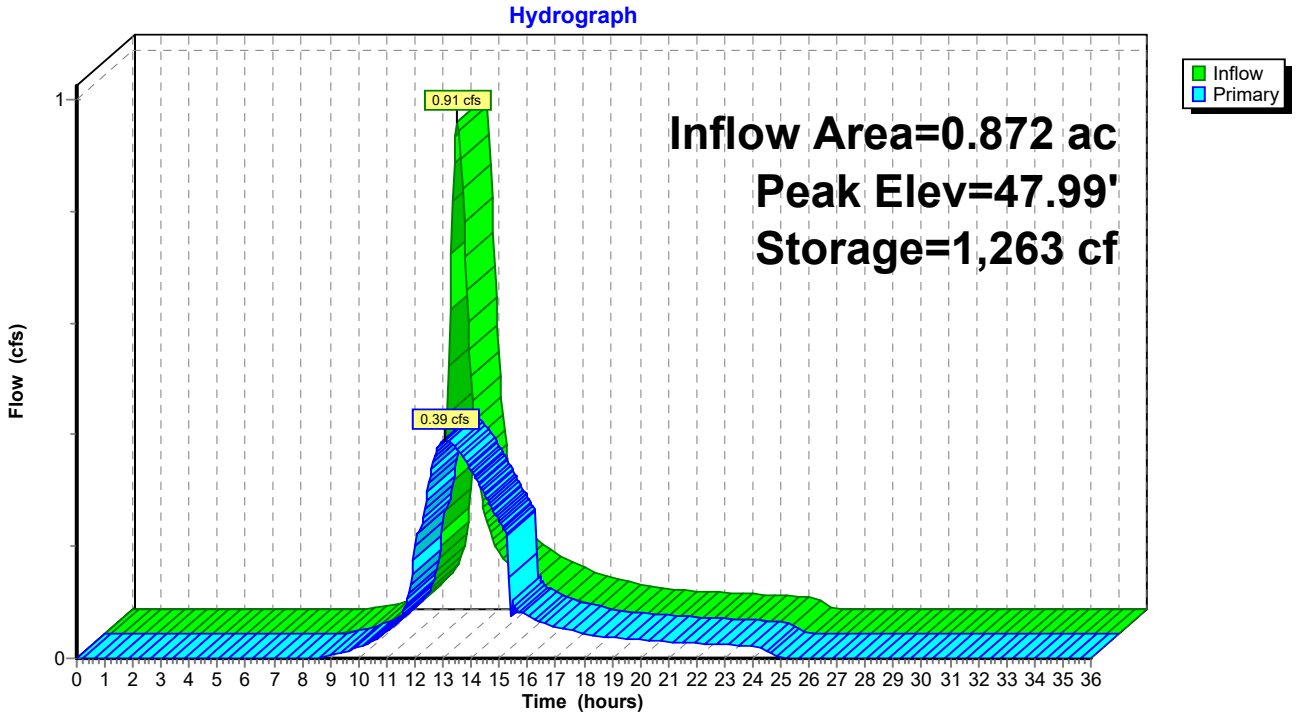
Volume	Invert	Avail.Storage	Storage Description
#1	46.80'	3,953 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.80	0	0
47.30	16	16
47.80	888	904
48.30	944	1,848
48.80	1,001	2,849
49.30	544	3,393
49.80	560	3,953

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**4.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.72' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	48.10'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.10' / 48.00' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.39 cfs @ 13.09 hrs HW=47.99' TW=47.13' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.39 cfs @ 4.47 fps)
2=Culvert (Controls 0.00 cfs)

Pond SB 11 S: SB 11 S



Summary for Pond SB 12 B: SB 12 B

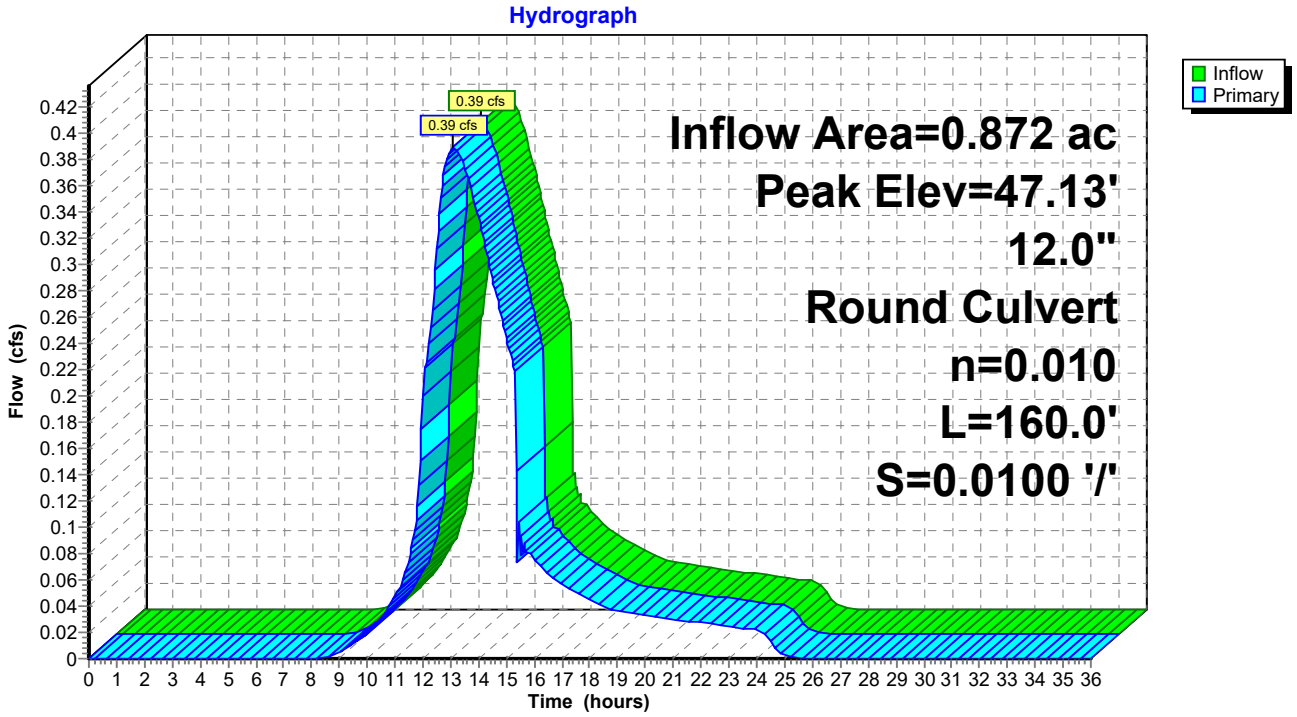
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 1.76" for 2 yr event
Inflow = 0.39 cfs @ 13.09 hrs, Volume= 0.128 af
Outflow = 0.39 cfs @ 13.09 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 13.09 hrs, Volume= 0.128 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.13' @ 13.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 45.20' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.39 cfs @ 13.09 hrs HW=47.13' TW=46.34' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.39 cfs @ 2.58 fps)

Pond SB 12 B: SB 12 B

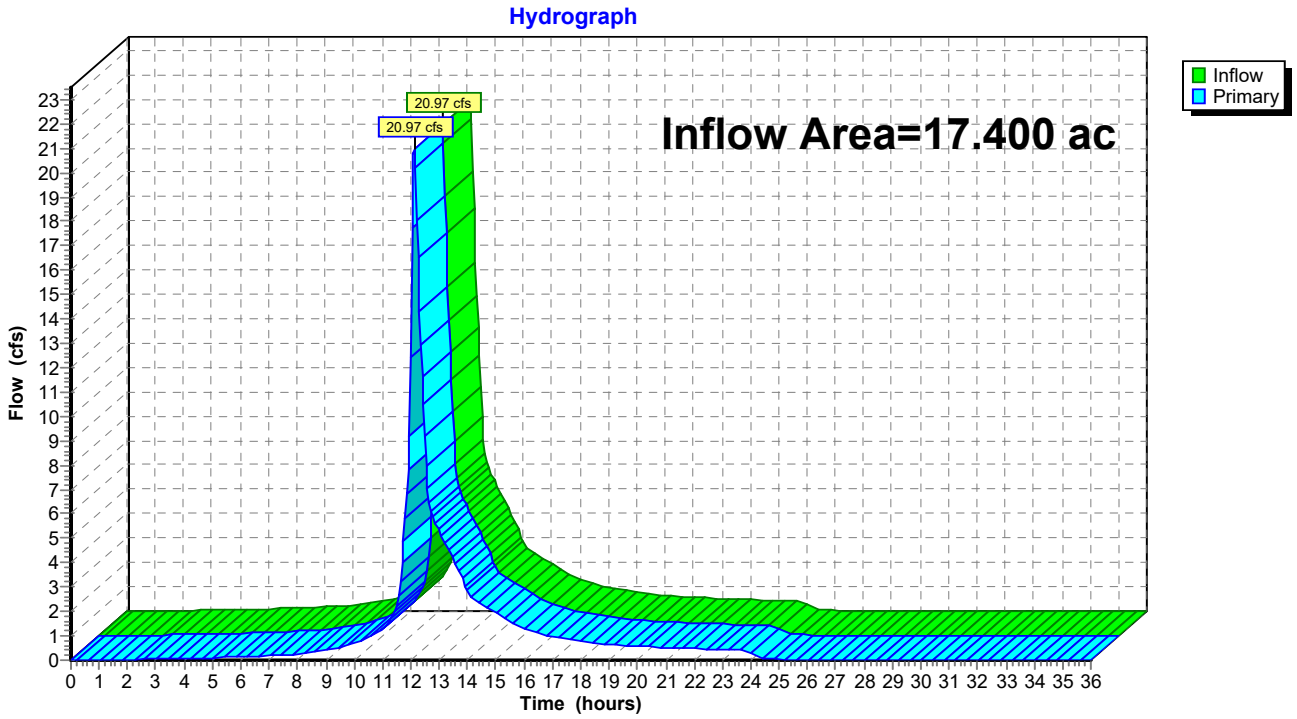


Summary for Link POA: POA

Inflow Area = 17.400 ac, 49.60% Impervious, Inflow Depth > 1.73" for 2 yr event
Inflow = 20.97 cfs @ 12.12 hrs, Volume= 2.510 af
Primary = 20.97 cfs @ 12.12 hrs, Volume= 2.510 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POA: POA



Summary for Subcatchment PR-1: PR-1

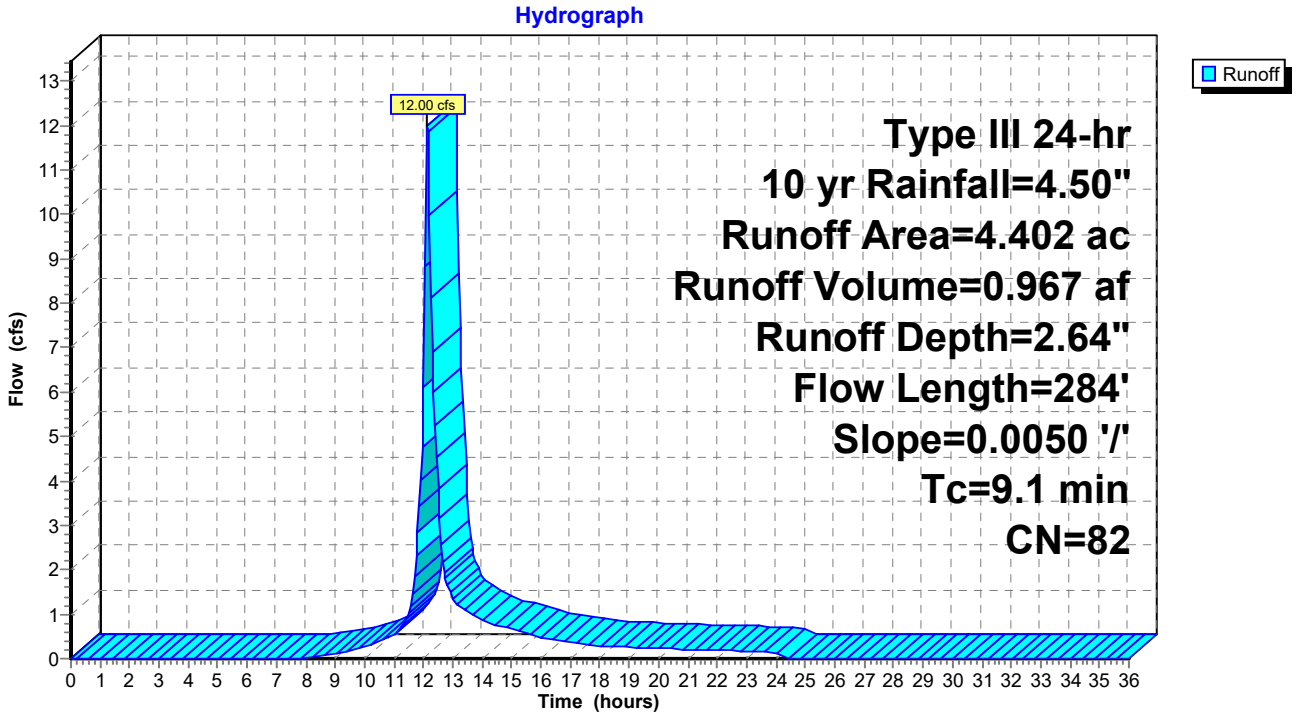
Runoff = 12.00 cfs @ 12.13 hrs, Volume= 0.967 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
1.892	61	>75% Grass cover, Good, HSG B
2.510	98	Paved parking, HSG B
4.402	82	Weighted Average
1.892		42.98% Pervious Area
2.510		57.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	50	0.0050	0.69		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
7.9	234	0.0050	0.49		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
9.1	284	Total			

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-1A: PR-1A

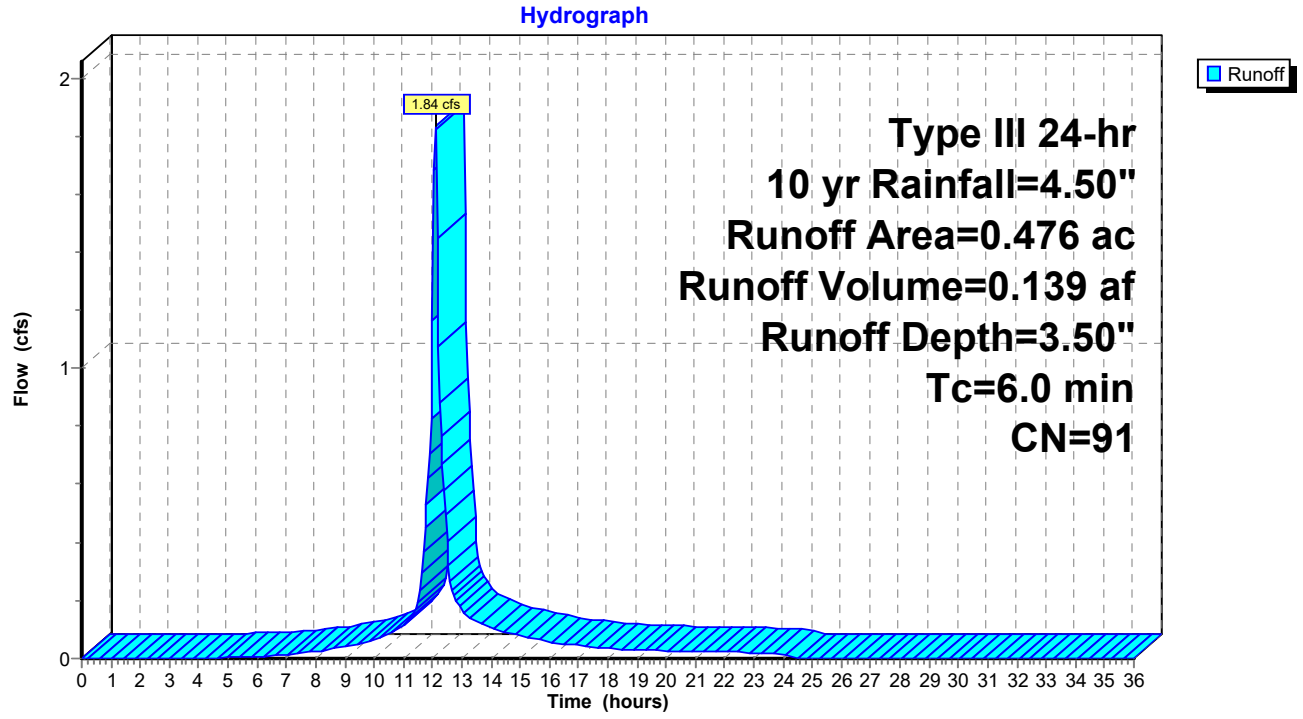
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 0.139 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.090	61	>75% Grass cover, Good, HSG B
0.386	98	Paved parking, HSG B
0.476	91	Weighted Average
0.090		18.91% Pervious Area
0.386		81.09% Impervious Area

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

Subcatchment PR-1A: PR-1A



Summary for Subcatchment PR-1B: PR-1B

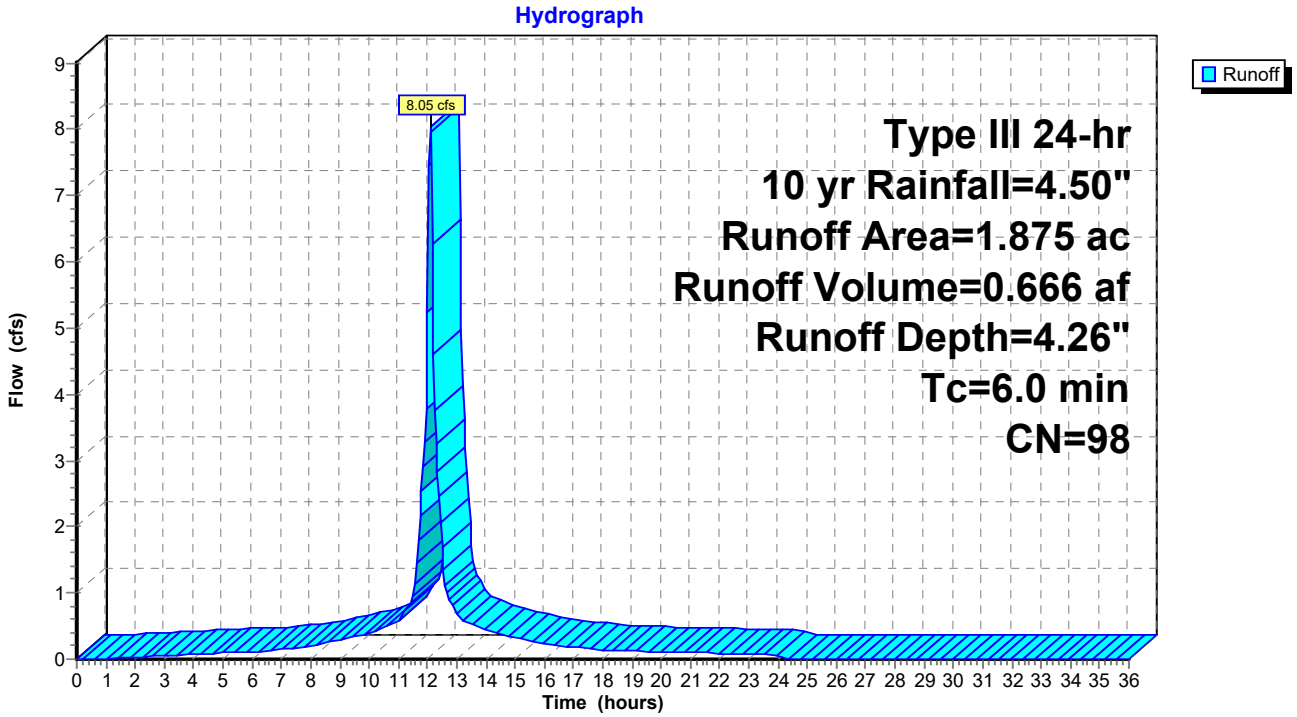
Runoff = 8.05 cfs @ 12.09 hrs, Volume= 0.666 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
1.875	98	Roofs, HSG B
1.875		100.00% Impervious Area

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

Subcatchment PR-1B: PR-1B



Summary for Subcatchment PR-1C: PR-1C

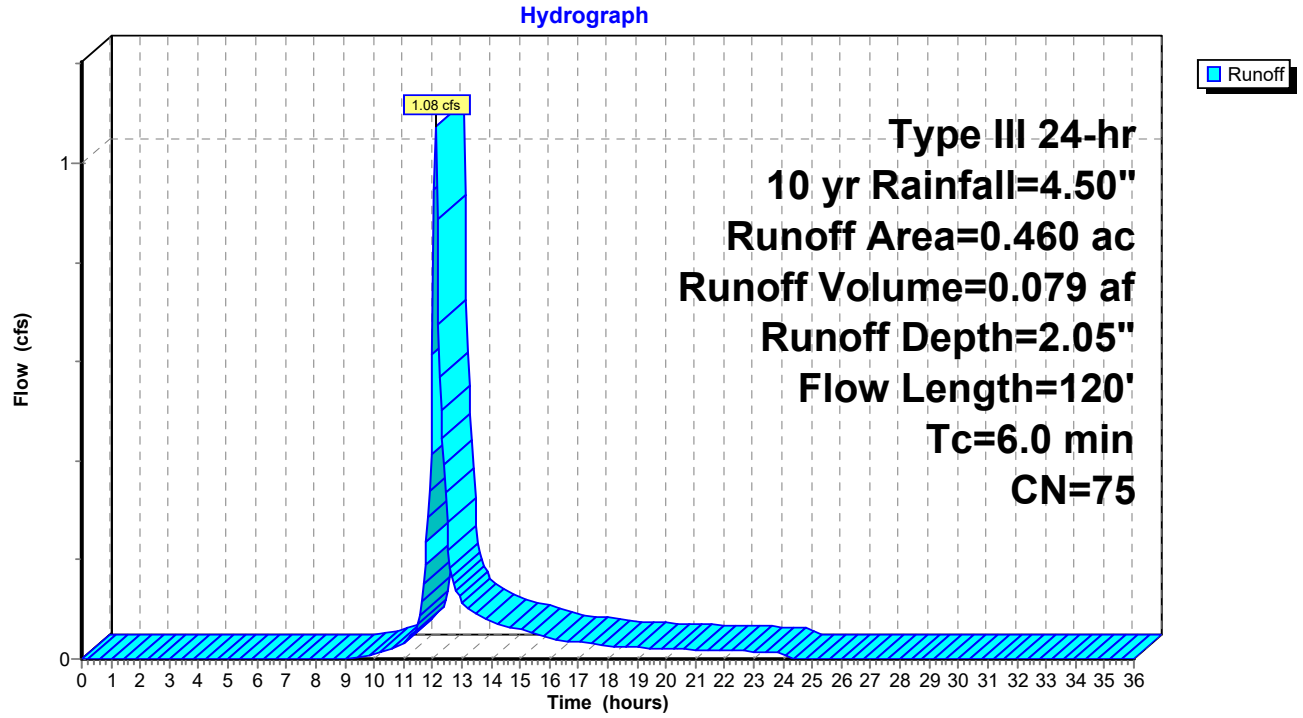
Runoff = 1.08 cfs @ 12.10 hrs, Volume= 0.079 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.020	55	Woods, Good, HSG B
0.260	61	>75% Grass cover, Good, HSG B
0.180	98	Paved parking, HSG B
0.460	75	Weighted Average
0.280		60.87% Pervious Area
0.180		39.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		**Sheet Flow, 20' SF** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	40	0.5000	0.35		**Sheet Flow, 30' SF** Grass: Dense n= 0.240 P2= 3.20"
0.1	12	0.0100	1.61		**Shallow Concentrated Flow, 12' SCF** Unpaved Kv= 16.1 fps
0.2	48	0.0400	4.06		**Shallow Concentrated Flow, 48' SCF** Paved Kv= 20.3 fps
5.8	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-1C: PR-1C



Summary for Subcatchment PR-1D: PR-1D

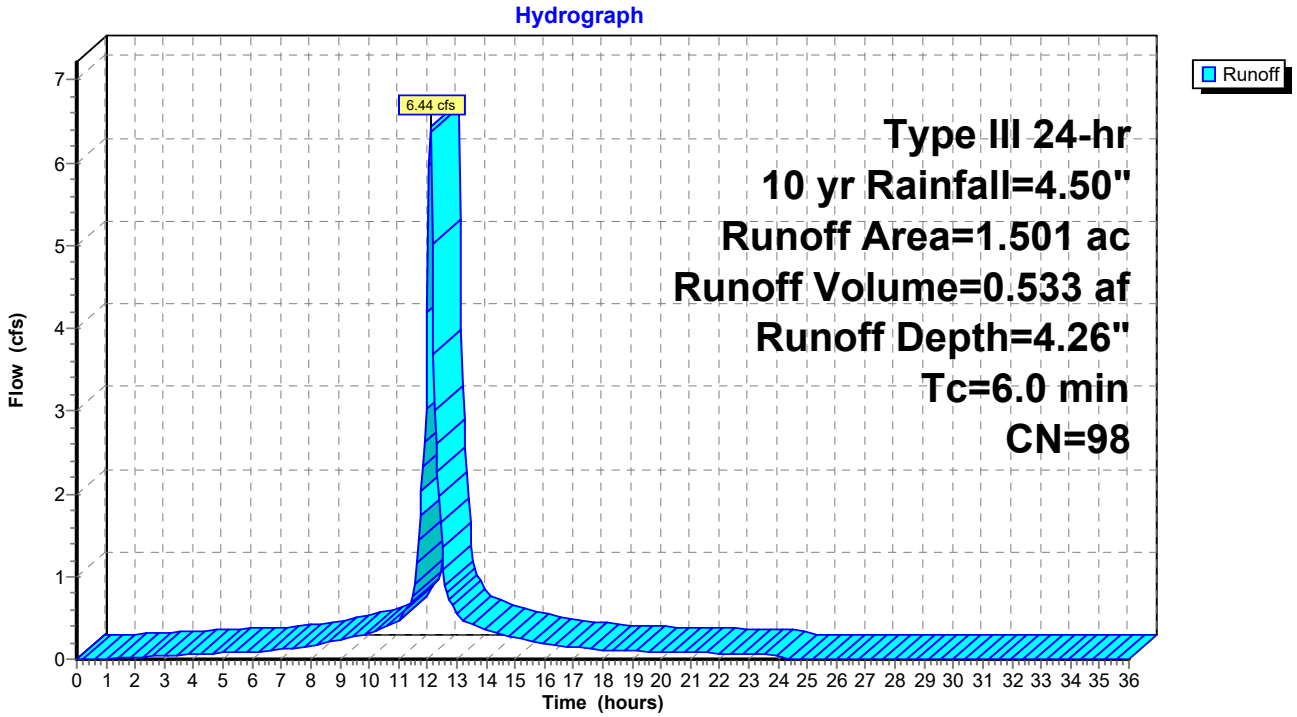
Runoff = 6.44 cfs @ 12.09 hrs, Volume= 0.533 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
1.501	98	Roofs, HSG B
1.501		100.00% Impervious Area

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

Subcatchment PR-1D: PR-1D



Summary for Subcatchment PR-1E: PR-1E

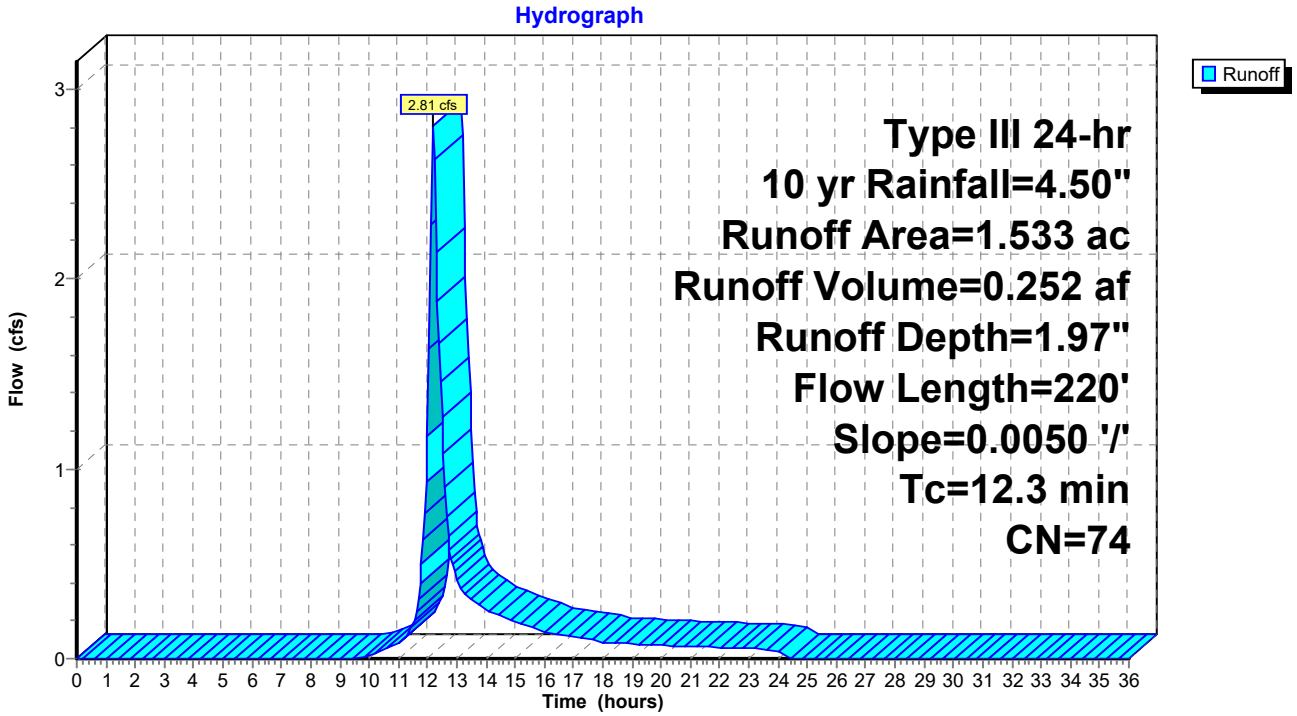
Runoff = 2.81 cfs @ 12.18 hrs, Volume= 0.252 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.533	98	Paved parking, HSG B
1.533	74	Weighted Average
1.000		65.23% Pervious Area
0.533		34.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
2.5	170	0.0050	1.14		**Shallow Concentrated Flow, 170' SCF** Unpaved Kv= 16.1 fps
12.3	220	Total			

Subcatchment PR-1E: PR-1E



Summary for Subcatchment PR-2: PR-2

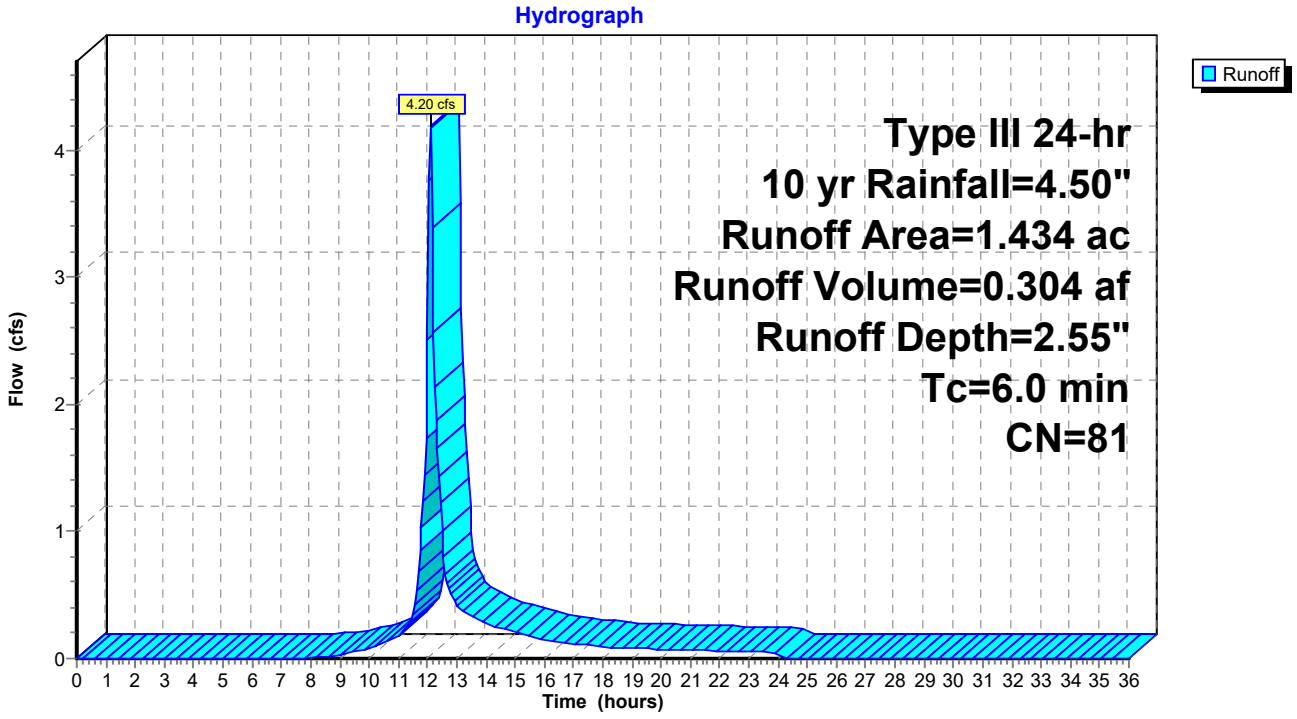
Runoff = 4.20 cfs @ 12.09 hrs, Volume= 0.304 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.672	61	>75% Grass cover, Good, HSG B
0.762	98	Paved parking, HSG B
1.434	81	Weighted Average
0.672		46.86% Pervious Area
0.762		53.14% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-2A: PR-2B

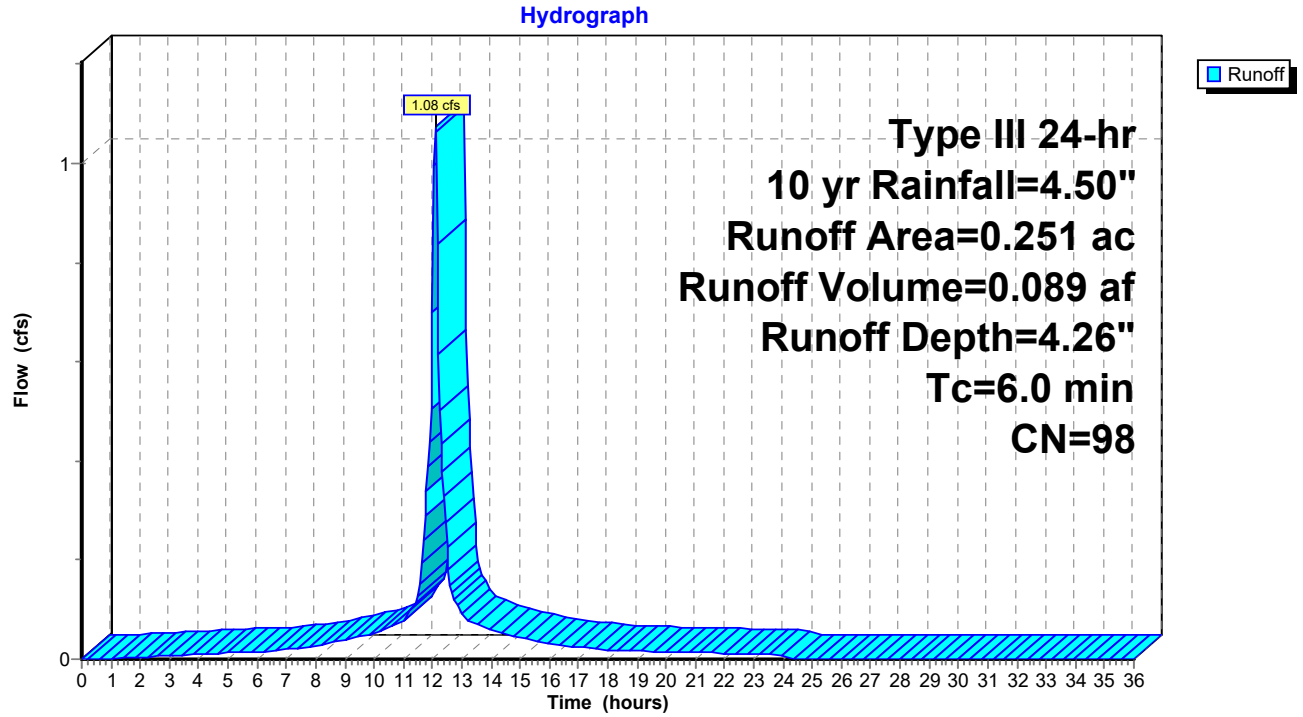
Runoff = 1.08 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.251	98	Roofs, HSG B
0.251		100.00% Impervious Area

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

Subcatchment PR-2A: PR-2B



Summary for Subcatchment PR-3A: PR-3A

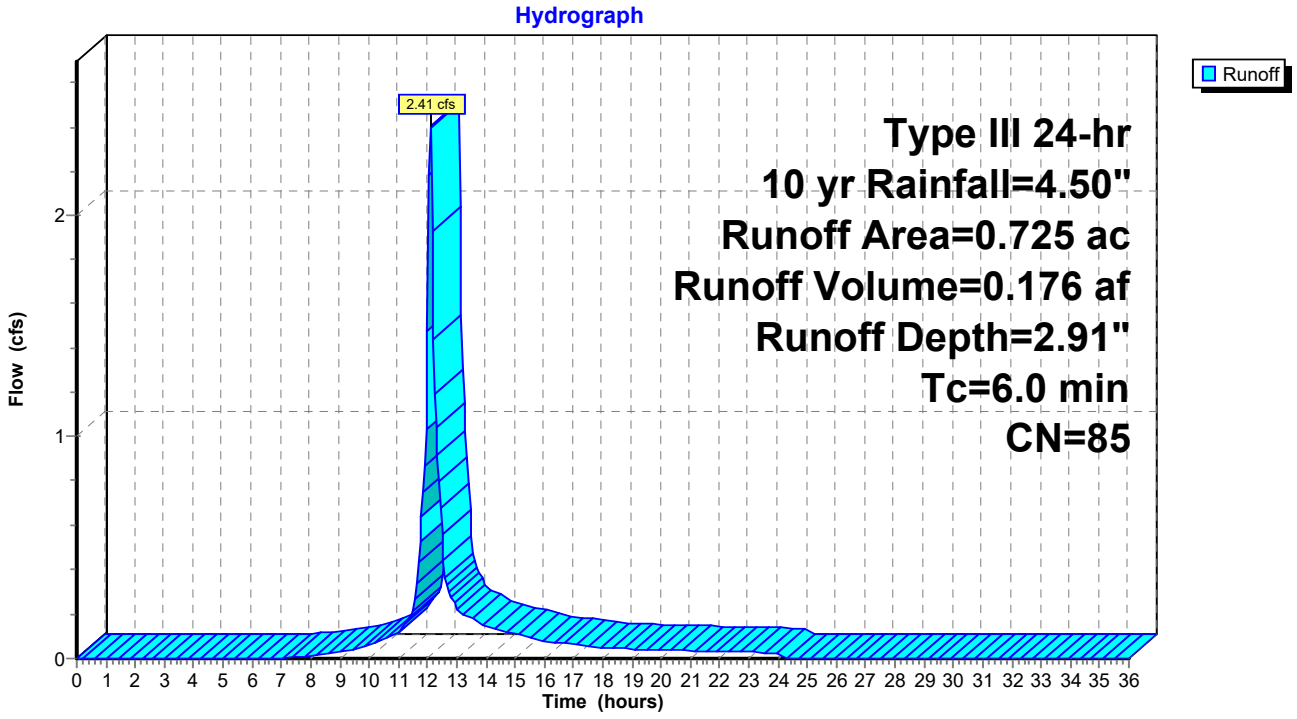
Runoff = 2.41 cfs @ 12.09 hrs, Volume= 0.176 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.249	61	>75% Grass cover, Good, HSG B
0.476	98	Paved parking, HSG B
0.725	85	Weighted Average
0.249		34.34% Pervious Area
0.476		65.66% Impervious Area

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

Subcatchment PR-3A: PR-3A



Summary for Subcatchment PR-3B: PR-3B

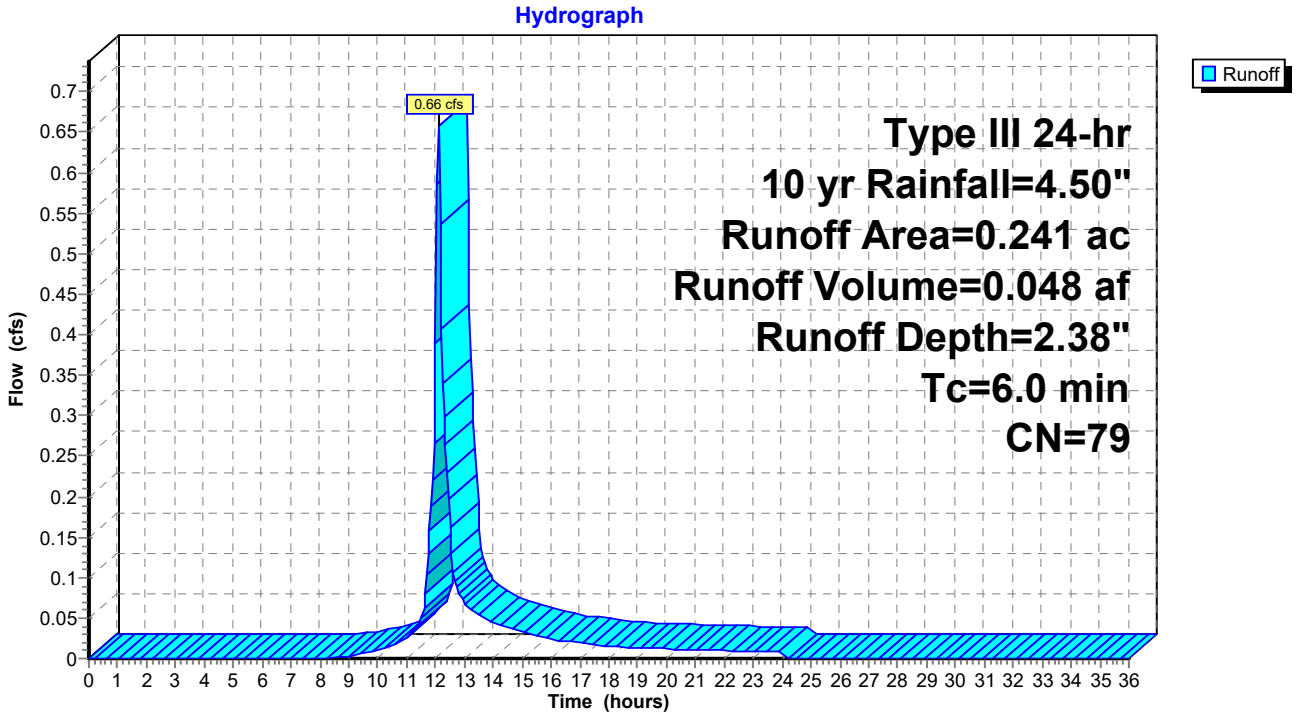
Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.124	61	>75% Grass cover, Good, HSG B
0.117	98	Paved parking, HSG B
0.241	79	Weighted Average
0.124		51.45% Pervious Area
0.117		48.55% Impervious Area

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

Subcatchment PR-3B: PR-3B



Summary for Subcatchment PR-3C: PR-3C

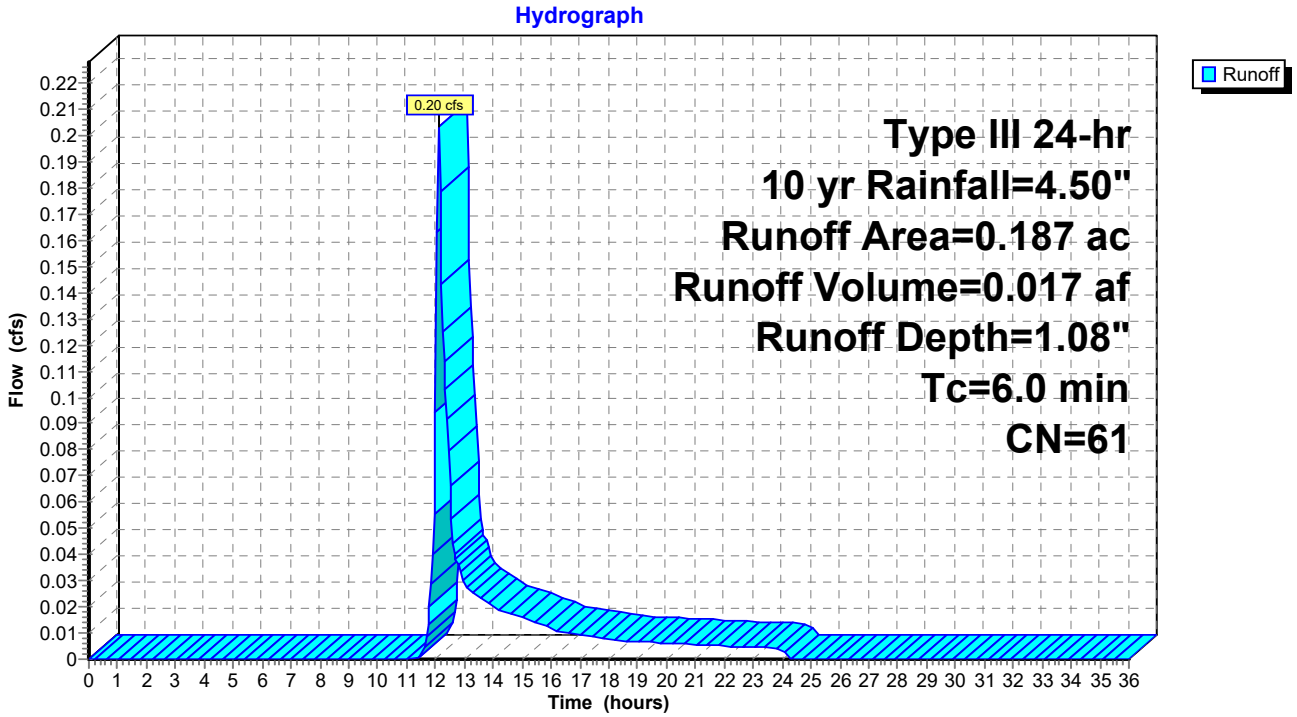
Runoff = 0.20 cfs @ 12.11 hrs, Volume= 0.017 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Description
0.187	61	>75% Grass cover, Good, HSG B
0.187		100.00% Pervious Area

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

Subcatchment PR-3C: PR-3C



Summary for Subcatchment PR-4A: PR-5A

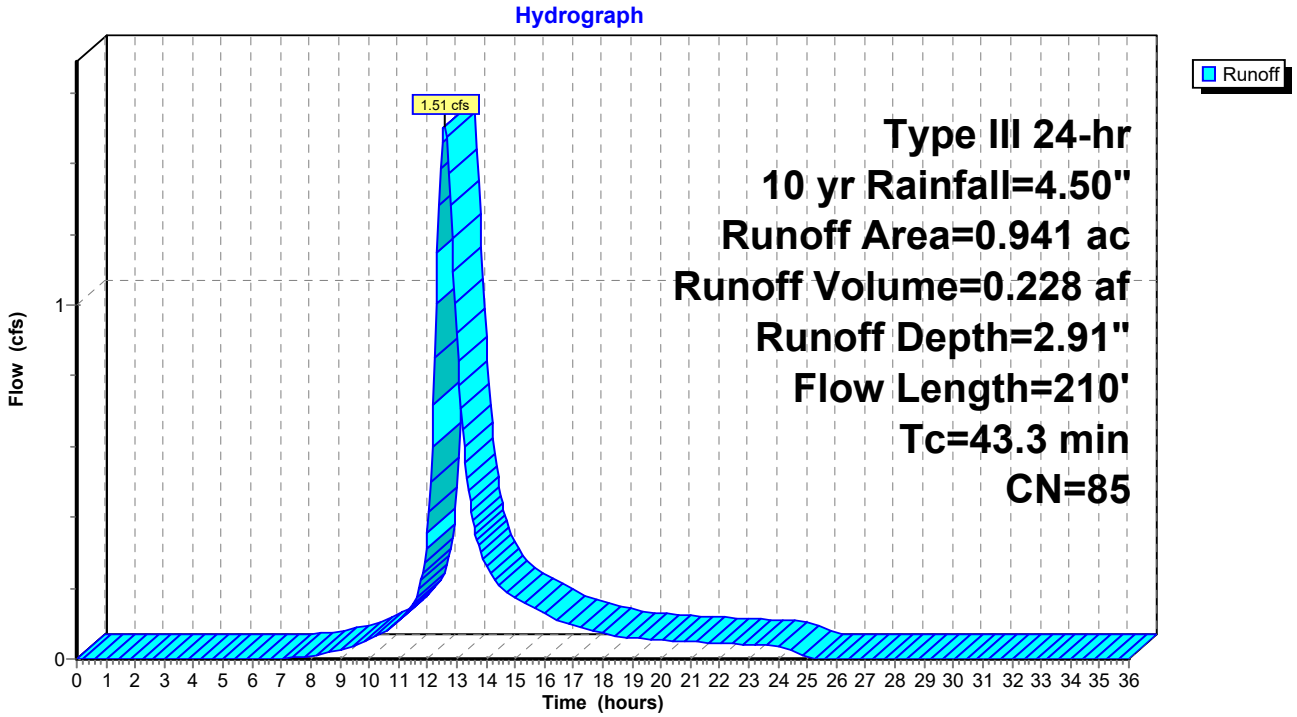
Runoff = 1.51 cfs @ 12.59 hrs, Volume= 0.228 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (ac)	CN	Description
*	0.941	85	SYNTHETIC TURF- PAD- LINER
	0.941		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	110	0.0055	0.05		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
43.3	210	Total			

Subcatchment PR-4A: PR-5A



Summary for Subcatchment PR-4B: SB 11 A

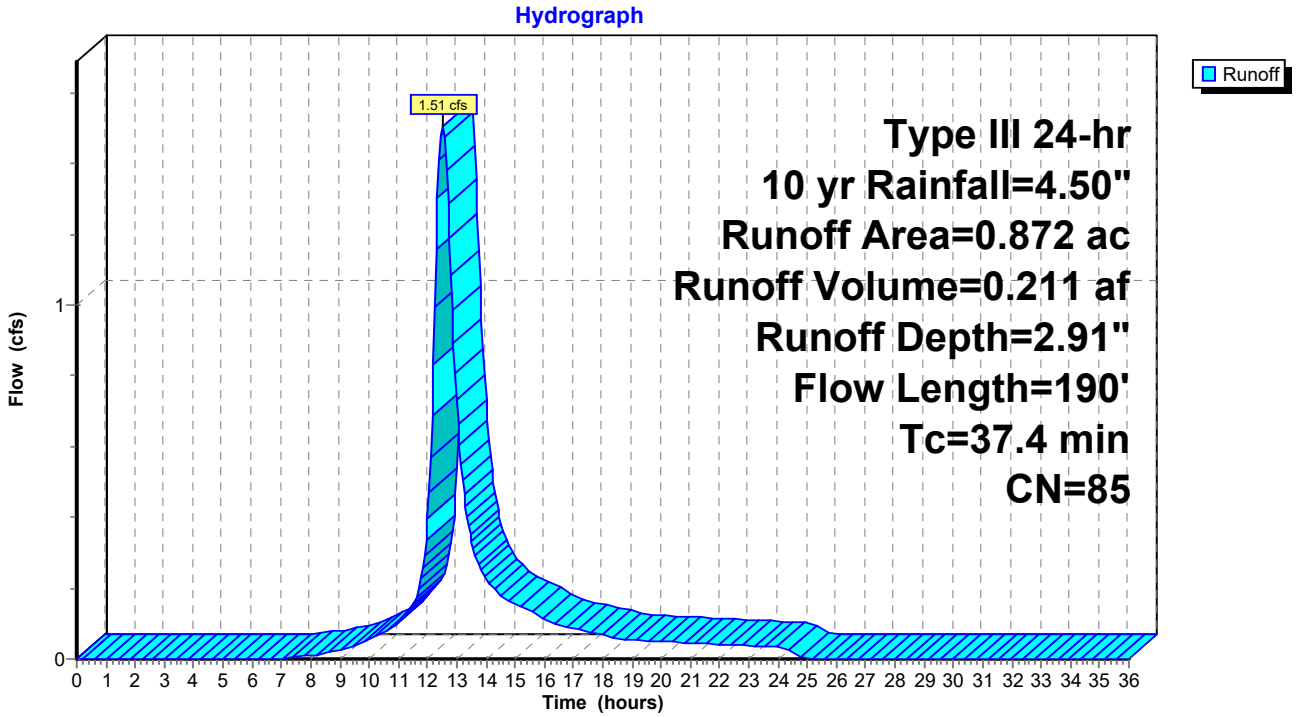
Runoff = 1.51 cfs @ 12.51 hrs, Volume= 0.211 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (ac)	CN	Description
*	0.872	85	SYNTHETIC TURF- PAD- LINER
	0.872		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	90	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
37.4	190	Total			

Subcatchment PR-4B: SB 11 A



Summary for Subcatchment PR-4C: SB 00 DPW SLOPE

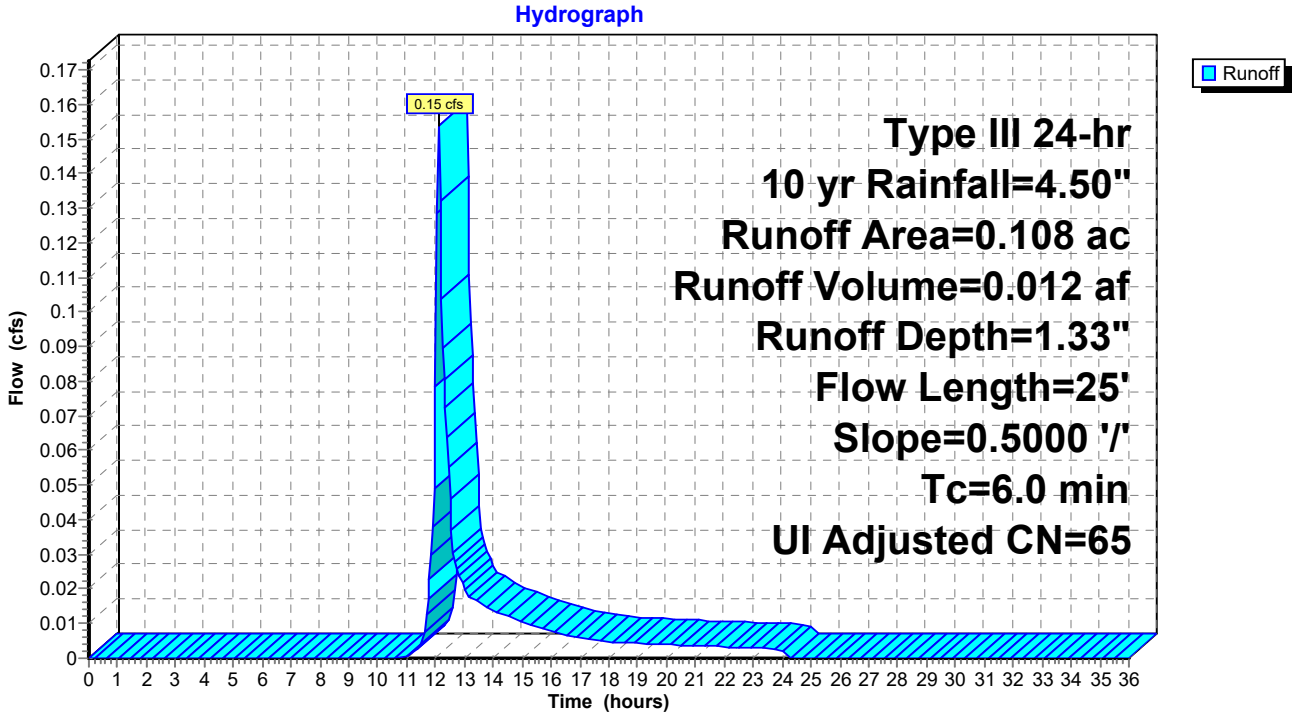
Runoff = 0.15 cfs @ 12.10 hrs, Volume= 0.012 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (ac)	CN	Adj	Description
0.025	98		Unconnected pavement, HSG B
0.083	61		>75% Grass cover, Good, HSG B
0.108	70	65	Weighted Average, UI Adjusted
0.083			76.85% Pervious Area
0.025			23.15% Impervious Area
0.025			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	25	0.5000	0.32		**Sheet Flow, SLOPING LAND** Grass: Dense n= 0.240 P2= 3.20"
1.3	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-4C: SB 00 DPW SLOPE



Summary for Subcatchment PR-5A: BB 01 A

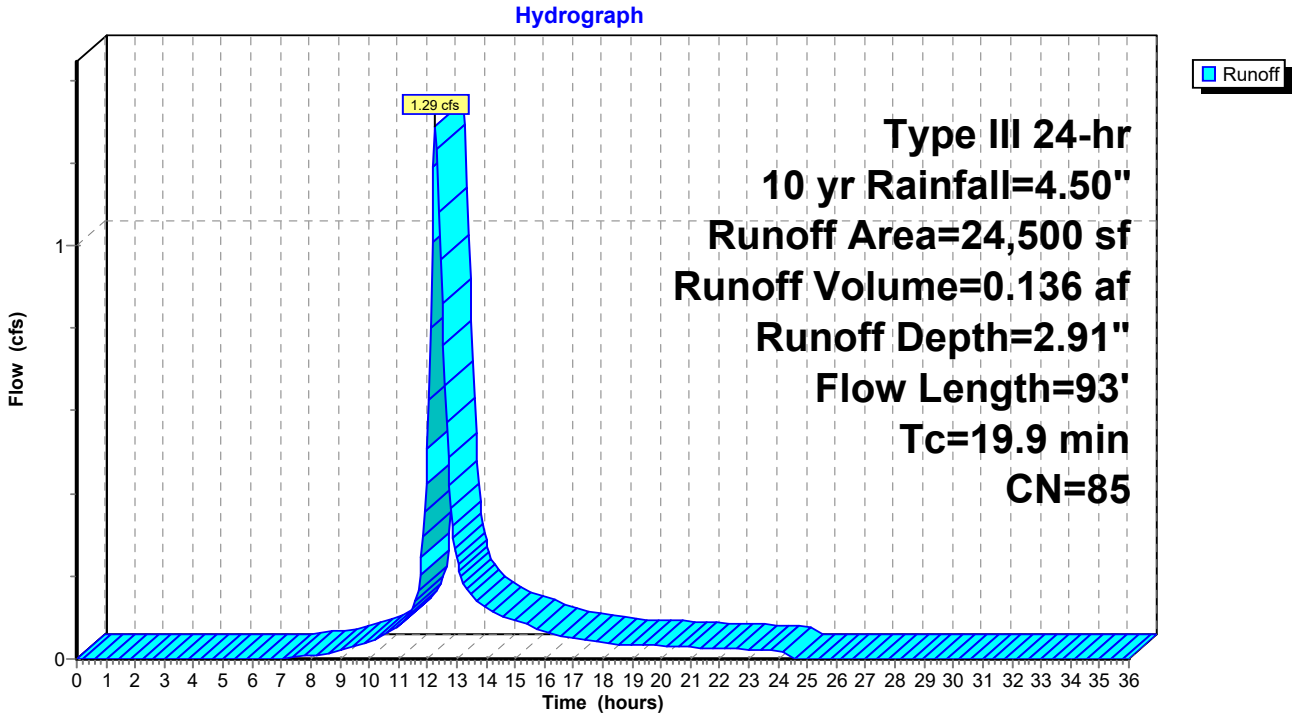
Runoff = 1.29 cfs @ 12.27 hrs, Volume= 0.136 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	24,500	85	SYNTHETIC TURF- PAD- LINER
	24,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	46	0.0067	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
19.9	93	Total			

Subcatchment PR-5A: BB 01 A



Summary for Subcatchment PR-5B: BB 11 A

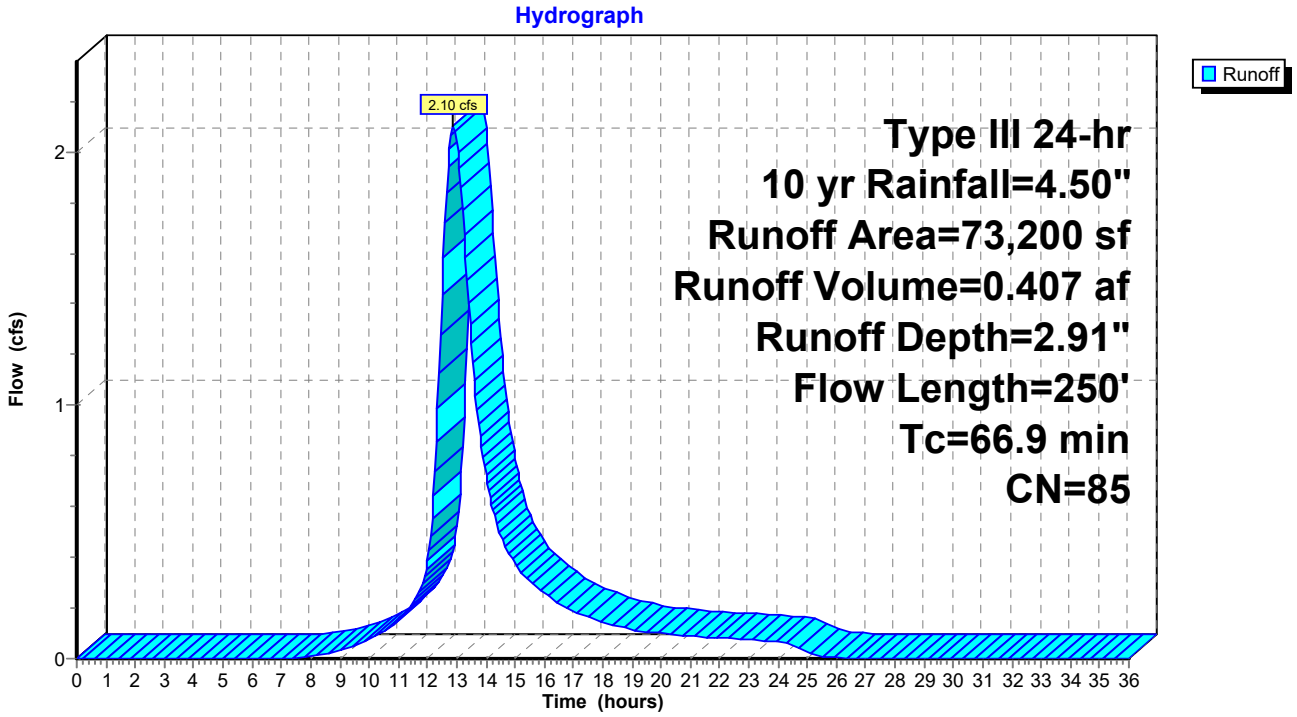
Runoff = 2.10 cfs @ 12.88 hrs, Volume= 0.407 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	73,200	85	SYNTHETIC TURF- PAD- LINER
	73,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	53	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
43.1	150	0.0083	0.06		**Sheet Flow, SYNTHETIC TURF** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
66.9	250	Total			

Subcatchment PR-5B: BB 11 A



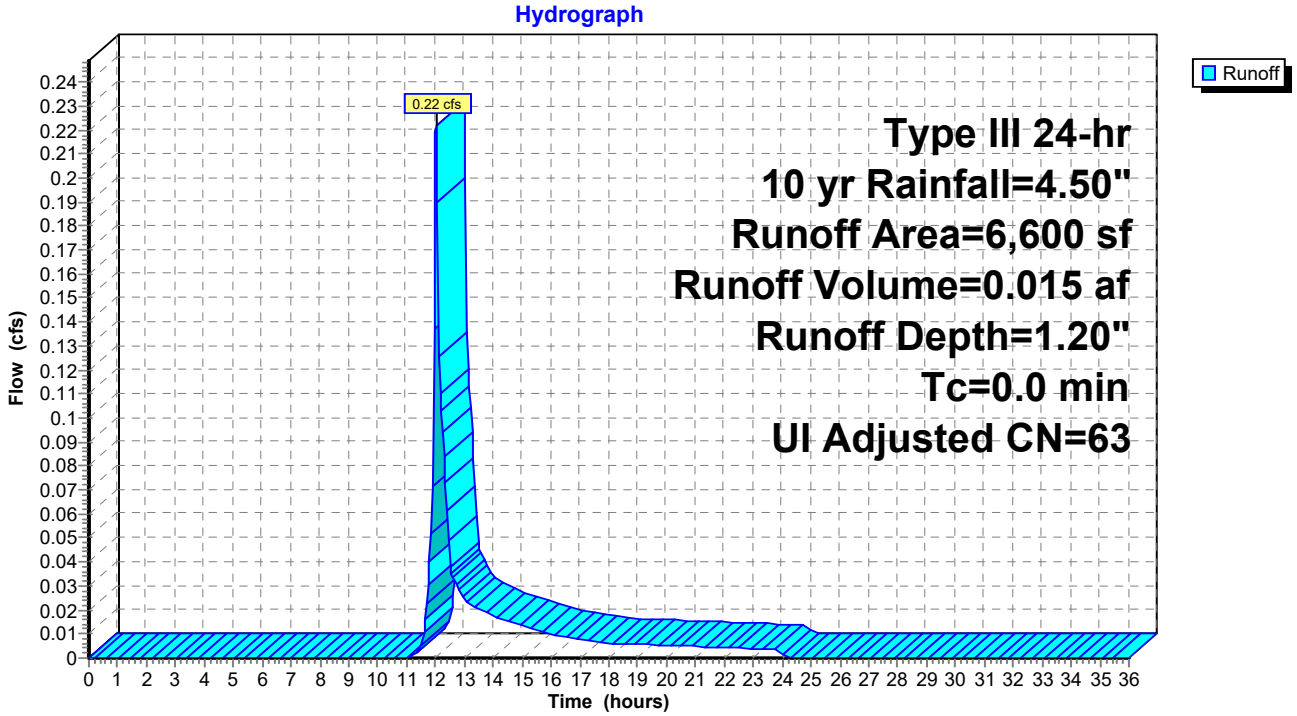
Summary for Subcatchment PR-5C: SLOPE

Runoff = 0.22 cfs @ 12.01 hrs, Volume= 0.015 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Adj	Description
600	98		Unconnected roofs, HSG B
6,000	61		>75% Grass cover, Good, HSG B
6,600	64	63	Weighted Average, UI Adjusted
6,000			90.91% Pervious Area
600			9.09% Impervious Area
600			100.00% Unconnected

Subcatchment PR-5C: SLOPE



Summary for Pond 1P: rain garden#1 cascading

Inflow Area = 0.725 ac, 65.66% Impervious, Inflow Depth = 2.91" for 10 yr event
Inflow = 2.41 cfs @ 12.09 hrs, Volume= 0.176 af
Outflow = 2.35 cfs @ 12.11 hrs, Volume= 0.174 af, Atten= 2%, Lag= 1.0 min
Primary = 2.35 cfs @ 12.11 hrs, Volume= 0.174 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 61.88' @ 12.11 hrs Surf.Area= 472 sf Storage= 494 cf
Flood Elev= 63.00' Surf.Area= 660 sf Storage= 1,132 cf

Plug-Flow detention time= 49.3 min calculated for 0.174 af (99% of inflow)
Center-of-Mass det. time= 43.5 min (855.2 - 811.7)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,048 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 1,348 cf Overall - 300 cf Embedded = 1,048 cf
#2	58.50'	30 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 75 cf Overall x 40.0% Voids
#3	59.00'	50 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 199 cf Overall x 25.0% Voids
#4	60.33'	5 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 26 cf Overall x 20.0% Voids
		1,132 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
60.50	150	300	300
61.00	236	97	397
62.00	503	370	766
63.00	660	582	1,348

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
59.00	150	75	75

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	150	0	0
60.33	150	199	199

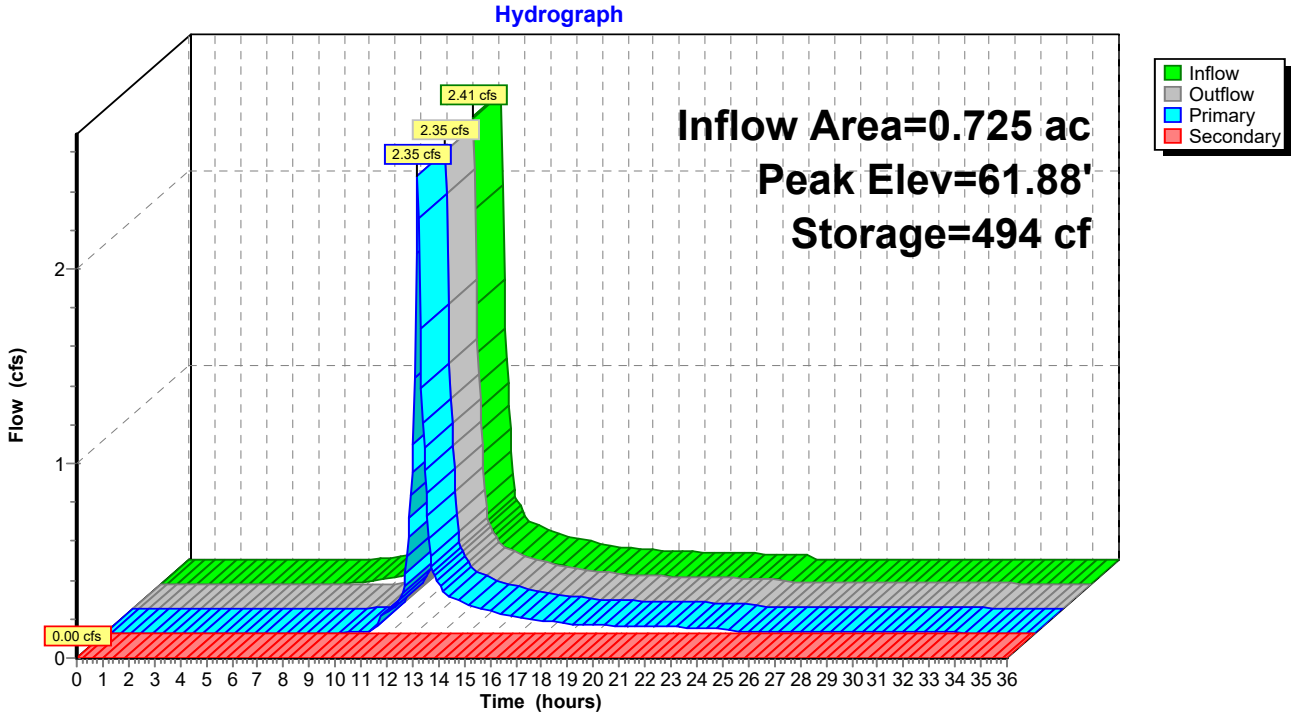
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.33	150	0	0
60.50	150	26	26

Device	Routing	Invert	Outlet Devices
#1	Device 3	58.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	62.00'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	58.50'	**8.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 58.50' / 58.40' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#4	Device 3	61.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.33 cfs @ 12.11 hrs HW=61.88' TW=54.20' (Dynamic Tailwater)
└─**3=Culvert** (Passes 2.33 cfs of 2.93 cfs potential flow)
  └─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 2.32 cfs @ 2.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' TW=51.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 1P: rain garden#1 cascading



Summary for Pond 2P: rain garden#2 cascading

Inflow Area = 0.966 ac, 61.39% Impervious, Inflow Depth > 2.75" for 10 yr event
Inflow = 3.01 cfs @ 12.10 hrs, Volume= 0.222 af
Outflow = 2.68 cfs @ 12.15 hrs, Volume= 0.214 af, Atten= 11%, Lag= 2.6 min
Primary = 2.68 cfs @ 12.15 hrs, Volume= 0.214 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 54.25' @ 12.15 hrs Surf.Area= 849 sf Storage= 963 cf
Flood Elev= 55.00' Surf.Area= 1,326 sf Storage= 1,784 cf

Plug-Flow detention time= 73.1 min calculated for 0.214 af (97% of inflow)
Center-of-Mass det. time= 46.0 min (895.5 - 849.6)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	1,557 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 2,357 cf Overall - 800 cf Embedded = 1,557 cf
#2	51.00'	80 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 200 cf Overall x 40.0% Voids
#3	51.50'	133 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 532 cf Overall x 25.0% Voids
#4	52.83'	14 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 68 cf Overall x 20.0% Voids
		1,784 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
53.00	400	800	800
54.00	694	547	1,347
55.00	1,326	1,010	2,357

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
51.50	400	200	200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	400	0	0
52.83	400	532	532

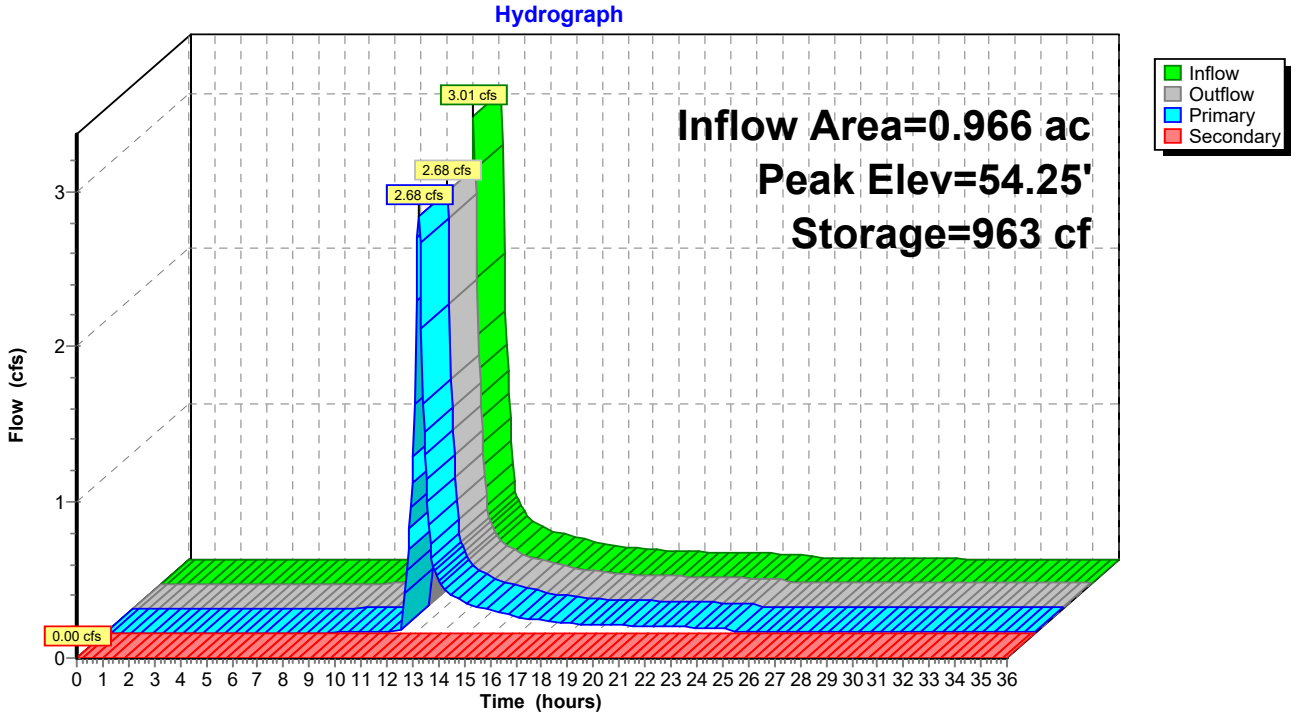
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
52.83	400	0	0
53.00	400	68	68

Device	Routing	Invert	Outlet Devices
#1	Device 3	51.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	54.50'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	51.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 51.00' / 50.88' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#4	Device 3	53.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.68 cfs @ 12.15 hrs HW=54.24' TW=48.92' (Dynamic Tailwater)
└─**3=Culvert** (Passes 2.68 cfs of 6.26 cfs potential flow)
  └─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 2.66 cfs @ 3.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.00' TW=46.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 2P: rain garden#2 cascading



Summary for Pond 3P: rain garden#3 cascading

Inflow Area = 1.153 ac, 51.43% Impervious, Inflow Depth > 2.41" for 10 yr event
Inflow = 2.86 cfs @ 12.14 hrs, Volume= 0.231 af
Outflow = 2.88 cfs @ 12.15 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.8 min
Primary = 2.88 cfs @ 12.15 hrs, Volume= 0.217 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.92' @ 12.16 hrs Surf.Area= 930 sf Storage= 1,047 cf
Flood Elev= 50.00' Surf.Area= 1,373 sf Storage= 2,283 cf

Plug-Flow detention time= 101.5 min calculated for 0.217 af (94% of inflow)
Center-of-Mass det. time= 45.1 min (939.5 - 894.4)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	1,944 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 3,144 cf Overall - 1,200 cf Embedded = 1,944 cf
#2	46.00'	120 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 300 cf Overall x 40.0% Voids
#3	46.50'	199 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 798 cf Overall x 25.0% Voids
#4	47.83'	20 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 102 cf Overall x 20.0% Voids
		2,283 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
48.00	600	1,200	1,200
49.00	957	779	1,979
50.00	1,373	1,165	3,144

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
46.50	600	300	300

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.50	600	0	0
47.83	600	798	798

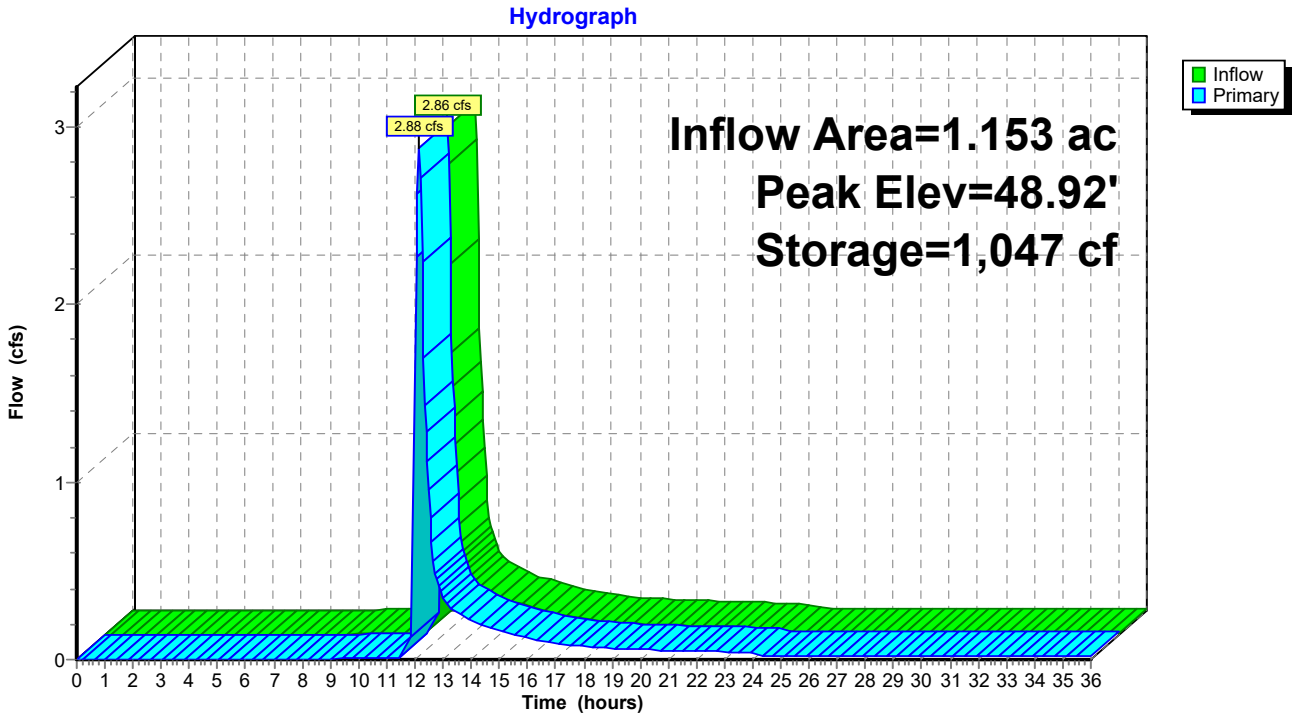
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.83	600	0	0
48.00	600	102	102

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	48.75'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#3	Primary	46.00'	**15.0" Round Culvert** L= 26.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.87' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.86 cfs @ 12.15 hrs HW=48.92' TW=0.00' (Dynamic Tailwater)
- **3=Culvert** (Passes 2.86 cfs of 7.07 cfs potential flow)
  - **1=Exfiltration** (Exfiltration Controls 0.02 cfs)
  - **2=Orifice/Grate** (Weir Controls 2.84 cfs @ 1.36 fps)

Pond 3P: rain garden#3 cascading



Summary for Pond 4P: UGS-1

Inflow Area = 1.685 ac, 60.12% Impervious, Inflow Depth = 2.80" for 10 yr event
Inflow = 5.27 cfs @ 12.09 hrs, Volume= 0.394 af
Outflow = 4.30 cfs @ 12.15 hrs, Volume= 0.373 af, Atten= 18%, Lag= 3.7 min
Discarded = 0.04 cfs @ 9.00 hrs, Volume= 0.098 af
Primary = 4.26 cfs @ 12.15 hrs, Volume= 0.275 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 42.88' @ 12.15 hrs Surf.Area= 1,672 sf Storage= 3,764 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 130.7 min (937.6 - 806.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.50'	2,099 cf	**29.92'W x 55.89'L x 5.50'H Field A** 9,196 cf Overall - 3,198 cf Embedded = 5,998 cf x 35.0% Voids
#2A	40.25'	3,198 cf	**ADS_StormTech MC-3500 d +Cap**x 28 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 28 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		5,297 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	39.50'	**24.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 39.50' / 39.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	43.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	39.50'	**1.020 in/hr Exfiltration over Surface area**
#4	Device 1	41.83'	**8.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 9.00 hrs HW=39.56' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=4.24 cfs @ 12.15 hrs HW=42.87' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 4.24 cfs of 23.30 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 4.24 cfs @ 4.05 fps)

Pond 4P: UGS-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

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

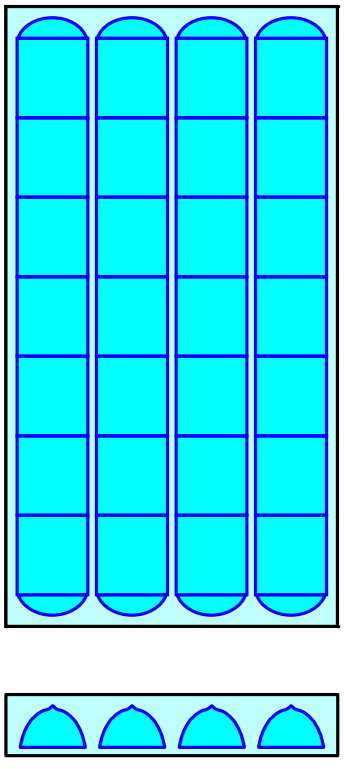
7 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 53.89' Row Length +12.0" End Stone x 2 = 55.89' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

28 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 3,197.9 cf Chamber Storage

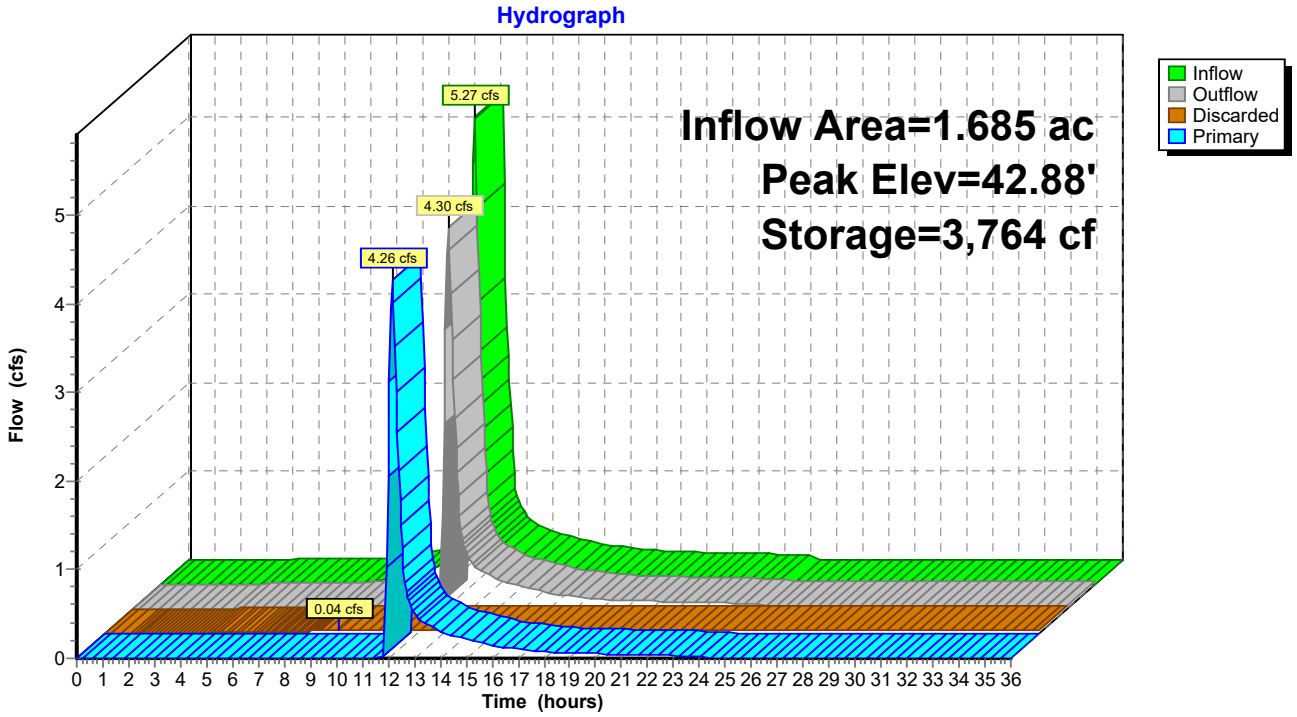
9,196.2 cf Field - 3,197.9 cf Chambers = 5,998.4 cf Stone x 35.0% Voids = 2,099.4 cf Stone Storage

Chamber Storage + Stone Storage = 5,297.3 cf = 0.122 af
Overall Storage Efficiency = 57.6%
Overall System Size = 55.89' x 29.92' x 5.50'

28 Chambers
340.6 cy Field
222.2 cy Stone



Pond 4P: UGS-1


Hydrograph
Inflow Area=1.685 ac
Peak Elev=42.88'
Storage=3,764 cf
5.27 cfs
4.30 cfs
4.26 cfs
0.04 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0 1 2 3 4 5
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

Summary for Pond BB 01 B: BB 01 B

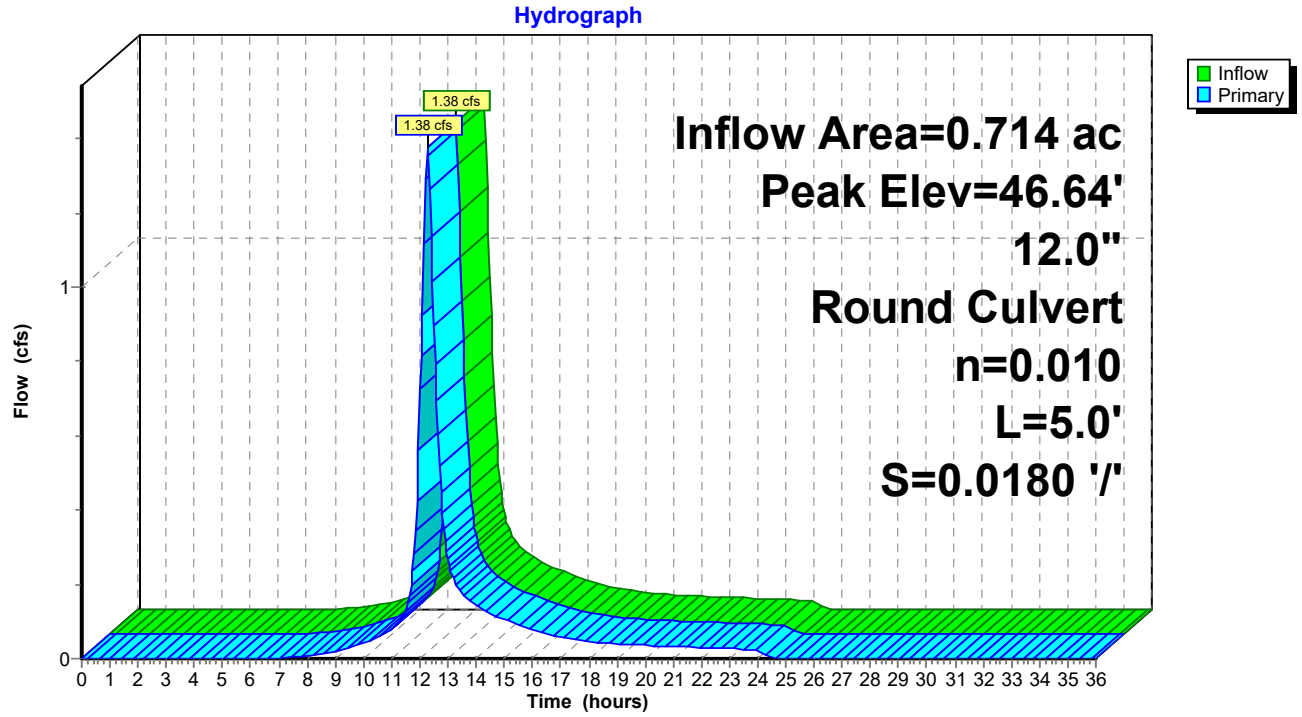
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 2.55" for 10 yr event
Inflow = 1.38 cfs @ 12.27 hrs, Volume= 0.152 af
Outflow = 1.38 cfs @ 12.27 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min
Primary = 1.38 cfs @ 12.27 hrs, Volume= 0.152 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.64' @ 12.65 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.81' S= 0.0180 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.37 cfs @ 12.27 hrs HW=46.60' TW=46.19' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.37 cfs @ 3.28 fps)

Pond BB 01 B: BB 01 B



Summary for Pond BB 01 S: BB 01 S

Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 2.55" for 10 yr event
Inflow = 1.38 cfs @ 12.27 hrs, Volume= 0.152 af
Outflow = 0.58 cfs @ 12.66 hrs, Volume= 0.152 af, Atten= 58%, Lag= 23.8 min
Primary = 0.58 cfs @ 12.66 hrs, Volume= 0.152 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.60' @ 12.67 hrs Surf.Area= 0 sf Storage= 1,600 cf

Plug-Flow detention time= 23.5 min calculated for 0.151 af (100% of inflow)
Center-of-Mass det. time= 23.5 min (852.5 - 829.0)

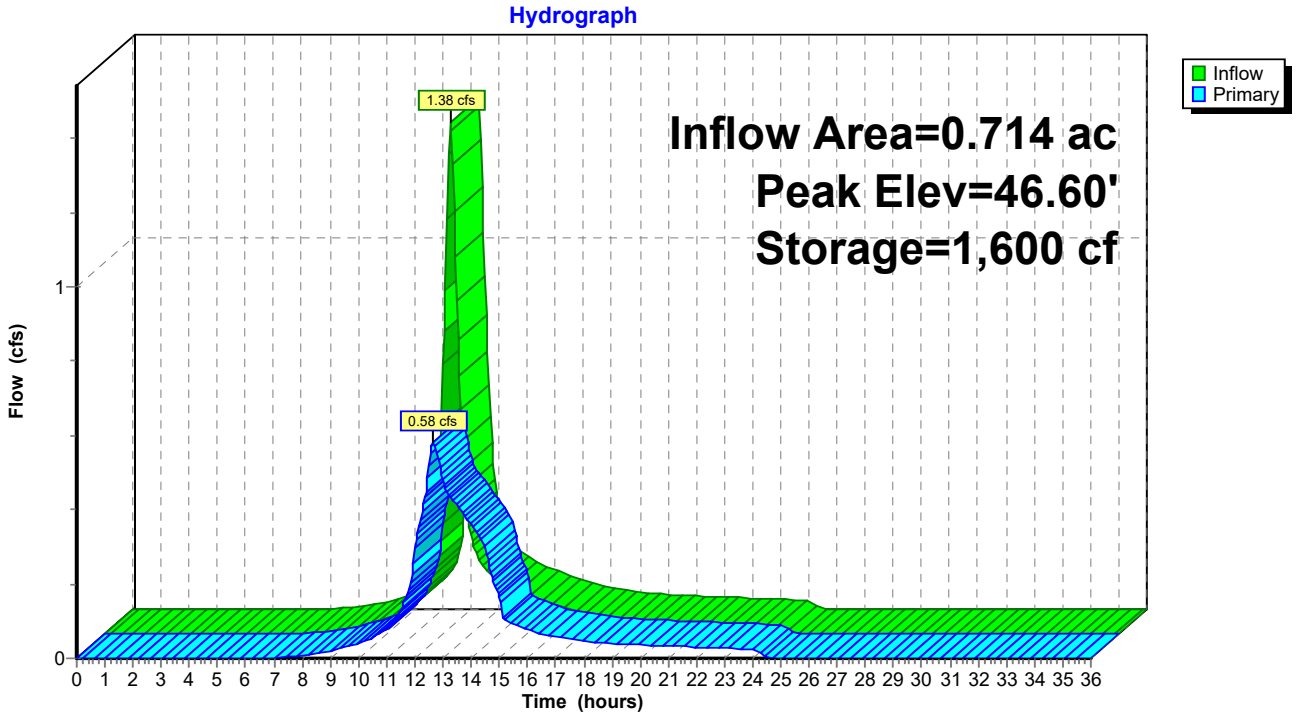
Volume	Invert	Avail.Storage	Storage Description
#1	44.97'	3,256 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.97	0	0
45.30	16	16
45.80	236	252
46.30	825	1,077
46.80	876	1,953
47.30	792	2,745
47.80	511	3,256

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**4.0" Round Culvert** L= 8.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 44.87' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	46.40'	**6.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.30' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Primary OutFlow Max=0.58 cfs @ 12.66 hrs HW=46.60' TW=45.35' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.47 cfs @ 5.38 fps)
2=Culvert (Inlet Controls 0.11 cfs @ 1.51 fps)

Pond BB 01 S: BB 01 S



Summary for Pond BB 06 B: BB 06 B

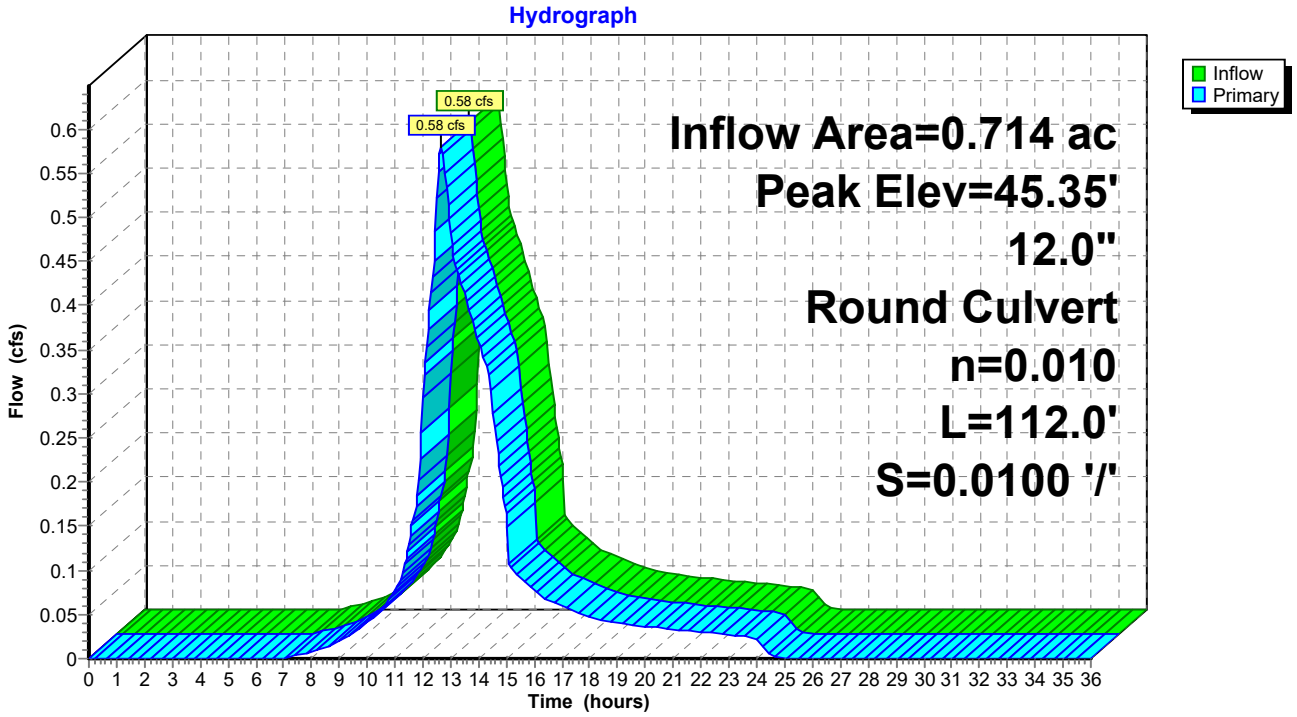
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 2.55" for 10 yr event
Inflow = 0.58 cfs @ 12.66 hrs, Volume= 0.152 af
Outflow = 0.58 cfs @ 12.66 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min
Primary = 0.58 cfs @ 12.66 hrs, Volume= 0.152 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 45.35' @ 12.66 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**12.0" Round Culvert** L= 112.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 43.85' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.58 cfs @ 12.66 hrs HW=45.35' TW=43.14' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.58 cfs @ 2.10 fps)

Pond BB 06 B: BB 06 B



Summary for Pond BB 11 B: BB 11 B

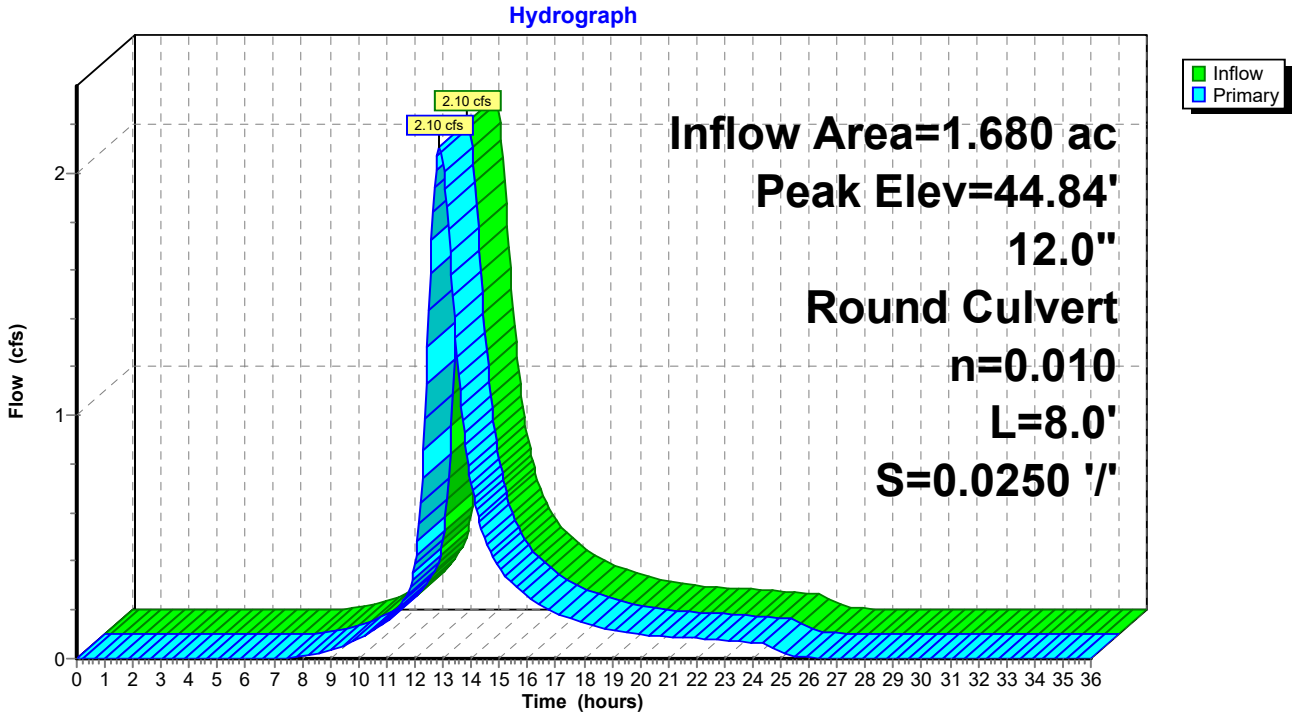
Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 2.91" for 10 yr event
Inflow = 2.10 cfs @ 12.88 hrs, Volume= 0.407 af
Outflow = 2.10 cfs @ 12.88 hrs, Volume= 0.407 af, Atten= 0%, Lag= 0.0 min
Primary = 2.10 cfs @ 12.88 hrs, Volume= 0.407 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 44.84' @ 12.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.00'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.00' / 43.80' S= 0.0250 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=2.10 cfs @ 12.88 hrs HW=44.84' TW=44.17' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.10 cfs @ 4.03 fps)

Pond BB 11 B: BB 11 B



Summary for Pond BB 11 S: BB 11 S

Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 2.91" for 10 yr event
Inflow = 2.10 cfs @ 12.88 hrs, Volume= 0.407 af
Outflow = 1.55 cfs @ 13.32 hrs, Volume= 0.407 af, Atten= 26%, Lag= 26.3 min
Primary = 1.55 cfs @ 13.32 hrs, Volume= 0.407 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 44.49' @ 13.32 hrs Surf.Area= 0 sf Storage= 1,849 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 7.6 min (875.7 - 868.1)

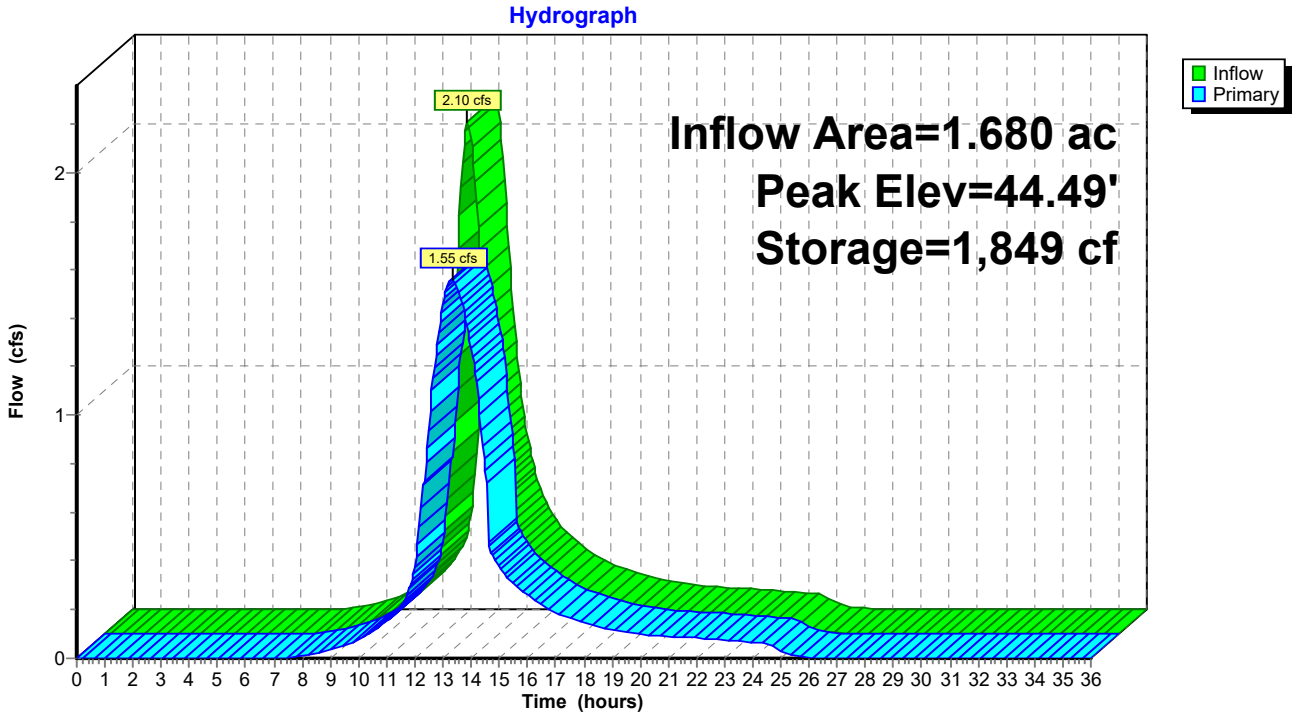
Volume	Invert	Avail.Storage	Storage Description
#1	42.97'	4,778 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.97	0	0
43.30	16	16
43.80	481	497
44.30	963	1,460
44.80	1,019	2,479
45.30	1,085	3,564
45.80	603	4,167
46.30	611	4,778

Device	Routing	Invert	Outlet Devices
#1	Primary	42.97'	**4.0" Round Culvert** L= 16.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.97' / 42.81' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	39.70'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.70' / 39.60' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Primary	44.50'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.50' / 44.40' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.55 cfs @ 13.32 hrs HW=44.49' TW=43.19' (Dynamic Tailwater)
- **1=Culvert** (Outlet Controls 0.48 cfs @ 5.47 fps)
- **2=Culvert** (Inlet Controls 1.08 cfs @ 5.48 fps)
- **3=Culvert** (Controls 0.00 cfs)

Pond BB 11 S: BB 11 S



Summary for Pond PR-4: PR-4

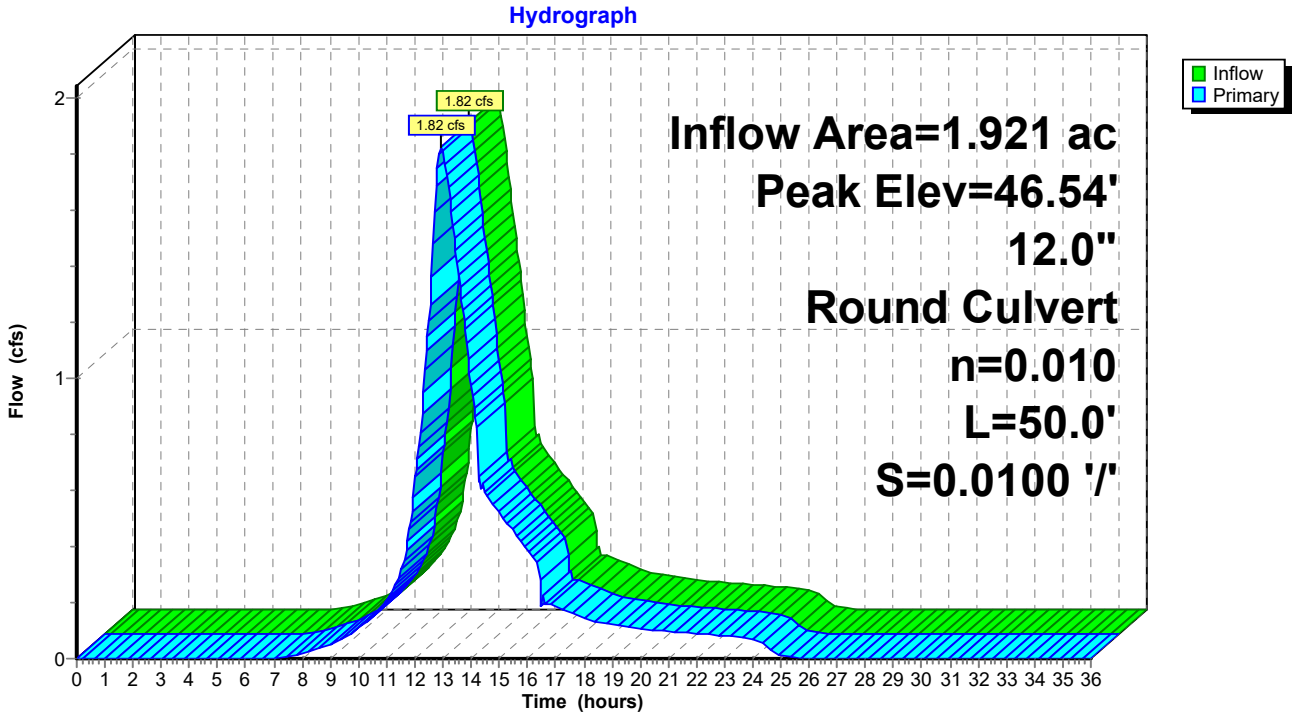
Inflow Area = 1.921 ac, 1.30% Impervious, Inflow Depth = 2.82" for 10 yr event
Inflow = 1.82 cfs @ 12.94 hrs, Volume= 0.451 af
Outflow = 1.82 cfs @ 12.94 hrs, Volume= 0.451 af, Atten= 0%, Lag= 0.0 min
Primary = 1.82 cfs @ 12.94 hrs, Volume= 0.451 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.54' @ 12.94 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.80'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.80' / 45.30' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.82 cfs @ 12.94 hrs HW=46.54' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.82 cfs @ 2.93 fps)

Pond PR-4: PR-4



Summary for Pond PR-5: PR-5

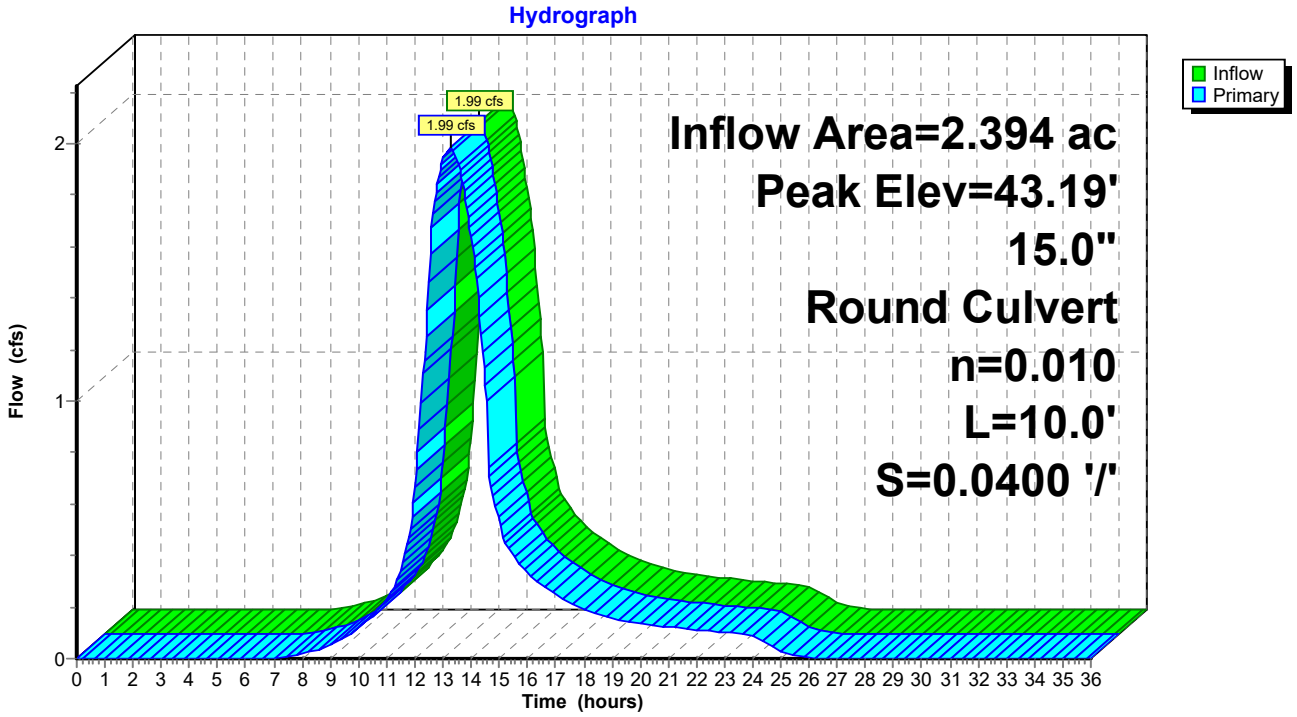
Inflow Area = 2.394 ac, 0.58% Impervious, Inflow Depth = 2.80" for 10 yr event
Inflow = 1.99 cfs @ 13.26 hrs, Volume= 0.559 af
Outflow = 1.99 cfs @ 13.26 hrs, Volume= 0.559 af, Atten= 0%, Lag= 0.0 min
Primary = 1.99 cfs @ 13.26 hrs, Volume= 0.559 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.19' @ 13.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.50'	**15.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.10' S= 0.0400 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=1.99 cfs @ 13.26 hrs HW=43.19' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.99 cfs @ 2.84 fps)

Pond PR-5: PR-5



Summary for Pond SB 01 B: SB 01 B

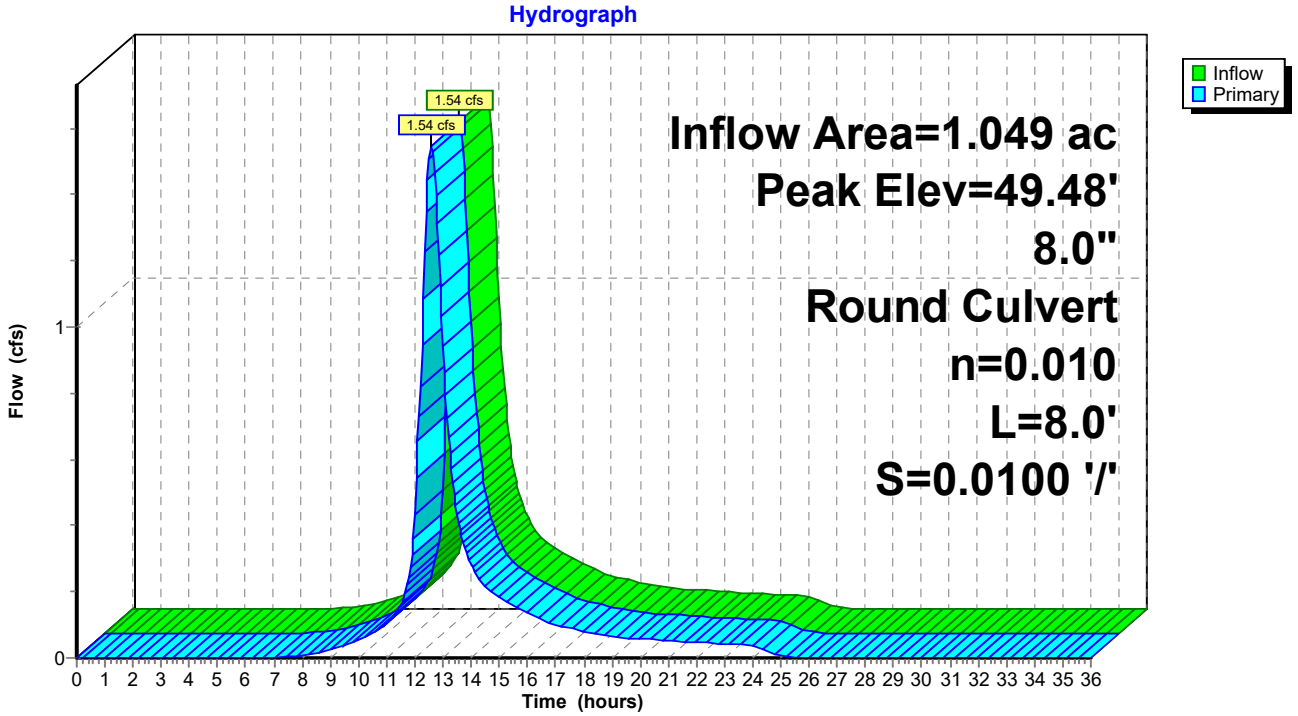
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 2.75" for 10 yr event
Inflow = 1.54 cfs @ 12.57 hrs, Volume= 0.240 af
Outflow = 1.54 cfs @ 12.57 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min
Primary = 1.54 cfs @ 12.57 hrs, Volume= 0.240 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 49.48' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.54 cfs @ 12.57 hrs HW=49.47' TW=47.58' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 1.54 cfs @ 4.41 fps)

Pond SB 01 B: SB 01 B



Summary for Pond SB 01 S: SB 01 S

Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 2.75" for 10 yr event
Inflow = 1.54 cfs @ 12.57 hrs, Volume= 0.240 af
Outflow = 0.99 cfs @ 12.97 hrs, Volume= 0.240 af, Atten= 36%, Lag= 23.7 min
Primary = 0.99 cfs @ 12.97 hrs, Volume= 0.240 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.90' @ 12.98 hrs Surf.Area= 0 sf Storage= 1,424 cf

Plug-Flow detention time= 9.7 min calculated for 0.240 af (100% of inflow)
Center-of-Mass det. time= 9.7 min (857.1 - 847.3)

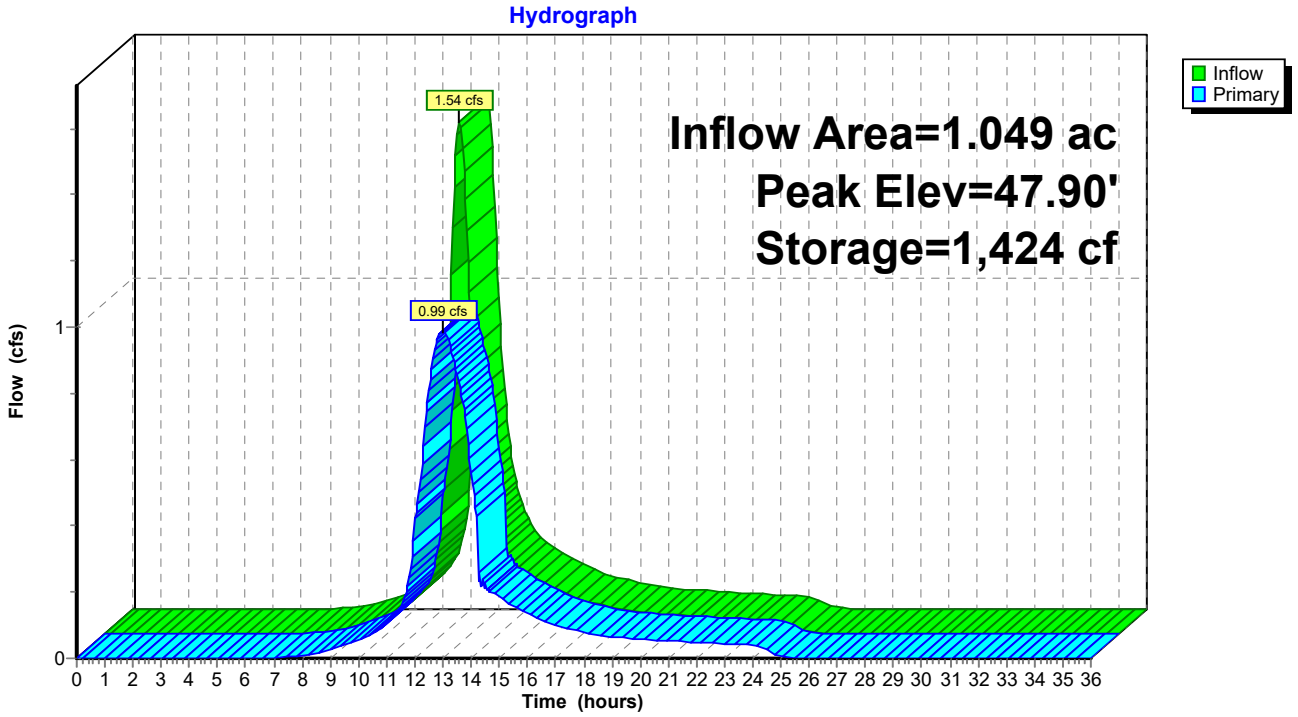
Volume	Invert	Avail.Storage	Storage Description
#1	46.30'	4,121 cf	**Custom Stage Data** Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.30	0	0
46.80	16	16
47.30	386	402
47.80	837	1,239
48.30	886	2,125
48.80	943	3,068
49.30	523	3,591
49.80	530	4,121

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.20' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#2	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.99 cfs @ 12.97 hrs HW=47.90' TW=46.82' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.99 cfs @ 5.02 fps)
2=Culvert (Controls 0.00 cfs)

Pond SB 01 S: SB 01 S



Summary for Pond SB 03 B: SB 03B

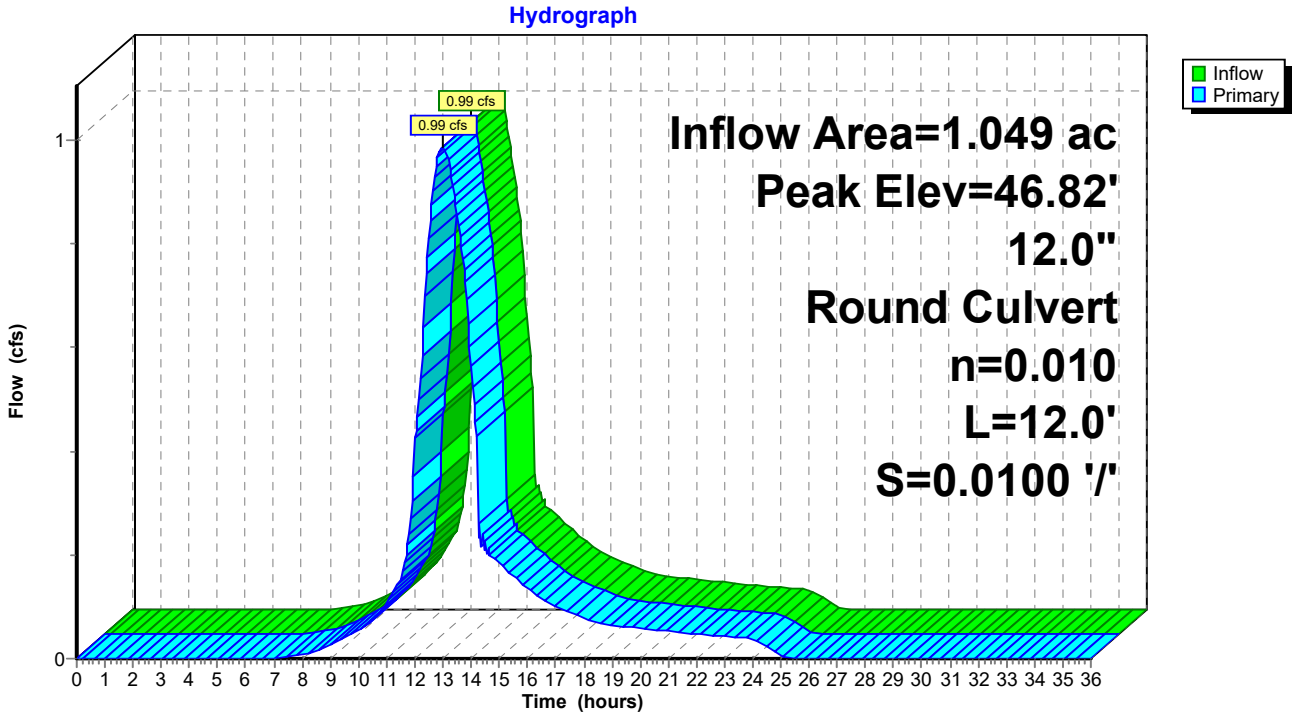
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 2.75" for 10 yr event
Inflow = 0.99 cfs @ 12.97 hrs, Volume= 0.240 af
Outflow = 0.99 cfs @ 12.97 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min
Primary = 0.99 cfs @ 12.97 hrs, Volume= 0.240 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.82' @ 12.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.25'	**12.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.25' / 46.13' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.99 cfs @ 12.97 hrs HW=46.82' TW=46.54' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.99 cfs @ 3.10 fps)

Pond SB 03 B: SB 03B



Summary for Pond SB 11 B: SB 11 B

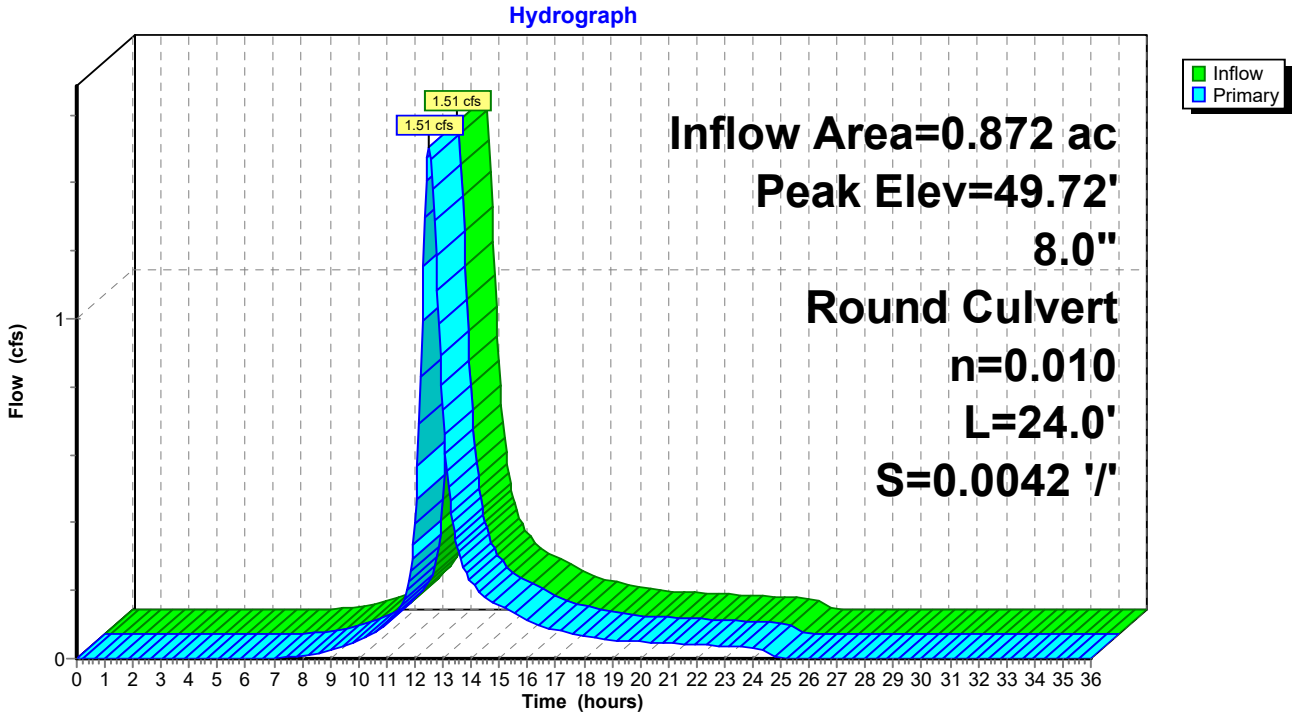
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 2.91" for 10 yr event
Inflow = 1.51 cfs @ 12.51 hrs, Volume= 0.211 af
Outflow = 1.51 cfs @ 12.51 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min
Primary = 1.51 cfs @ 12.51 hrs, Volume= 0.211 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 49.72' @ 12.51 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.50'	**8.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.50' / 48.40' S= 0.0042 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.51 cfs @ 12.51 hrs HW=49.72' TW=48.04' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 1.51 cfs @ 4.31 fps)

Pond SB 11 B: SB 11 B



Summary for Pond SB 11 S: SB 11 S

Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 2.91" for 10 yr event
Inflow = 1.51 cfs @ 12.51 hrs, Volume= 0.211 af
Outflow = 0.84 cfs @ 12.93 hrs, Volume= 0.211 af, Atten= 44%, Lag= 25.2 min
Primary = 0.84 cfs @ 12.93 hrs, Volume= 0.211 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.48' @ 12.93 hrs Surf.Area= 0 sf Storage= 2,214 cf

Plug-Flow detention time= 31.9 min calculated for 0.211 af (100% of inflow)
Center-of-Mass det. time= 31.5 min (872.3 - 840.8)

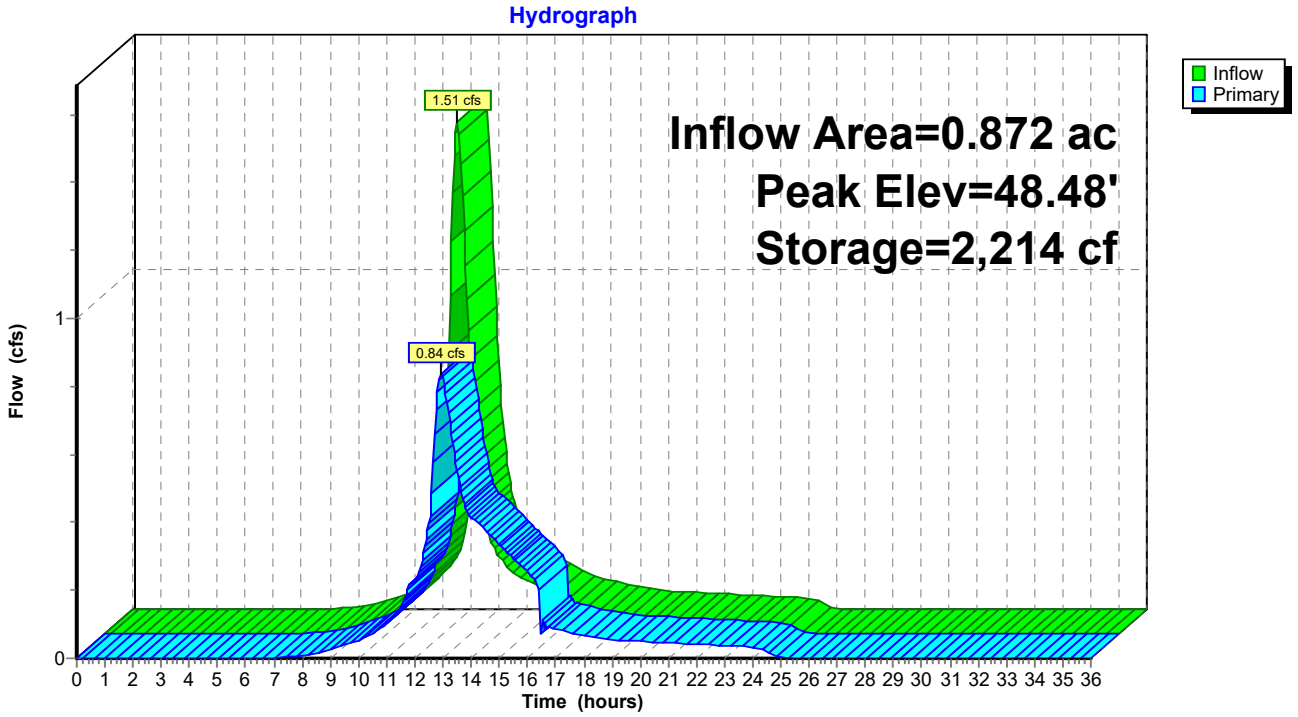
Volume	Invert	Avail.Storage	Storage Description
#1	46.80'	3,953 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.80	0	0
47.30	16	16
47.80	888	904
48.30	944	1,848
48.80	1,001	2,849
49.30	544	3,393
49.80	560	3,953

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**4.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.72' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	48.10'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.10' / 48.00' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.84 cfs @ 12.93 hrs HW=48.48' TW=47.31' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.46 cfs @ 5.22 fps)
2=Culvert (Barrel Controls 0.38 cfs @ 2.65 fps)

Pond SB 11 S: SB 11 S



Summary for Pond SB 12 B: SB 12 B

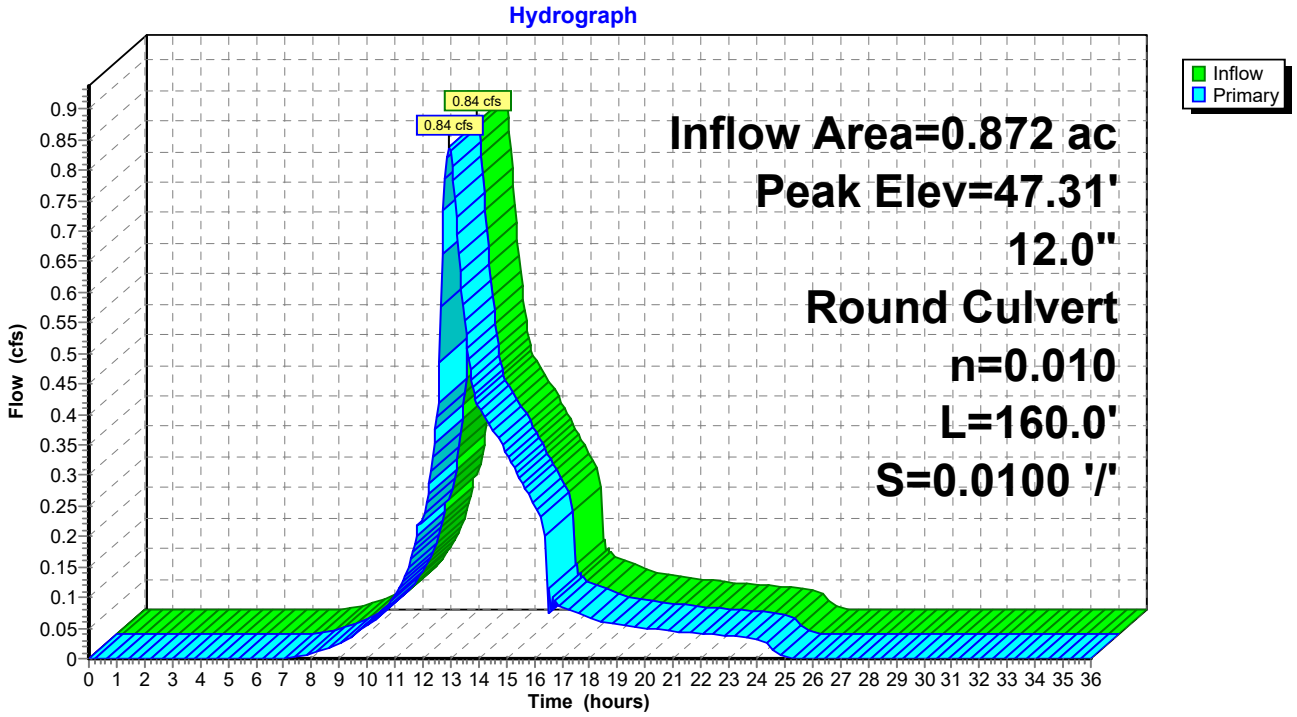
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 2.91" for 10 yr event
Inflow = 0.84 cfs @ 12.93 hrs, Volume= 0.211 af
Outflow = 0.84 cfs @ 12.93 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.93 hrs, Volume= 0.211 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.31' @ 12.94 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 45.20' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.93 hrs HW=47.31' TW=46.54' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.83 cfs @ 3.04 fps)

Pond SB 12 B: SB 12 B

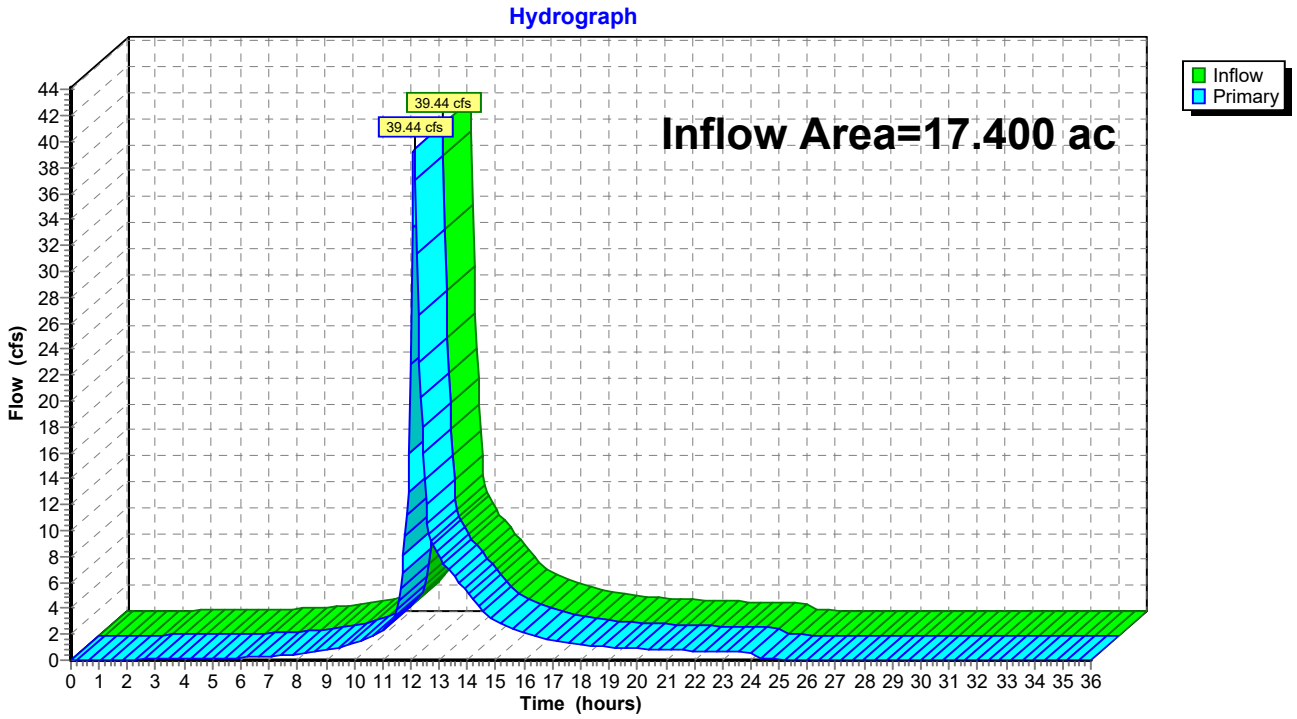


Summary for Link POA: POA

Inflow Area = 17.400 ac, 49.60% Impervious, Inflow Depth > 2.85" for 10 yr event
Inflow = 39.44 cfs @ 12.11 hrs, Volume= 4.138 af
Primary = 39.44 cfs @ 12.11 hrs, Volume= 4.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POA: POA



Summary for Subcatchment PR-1: PR-1

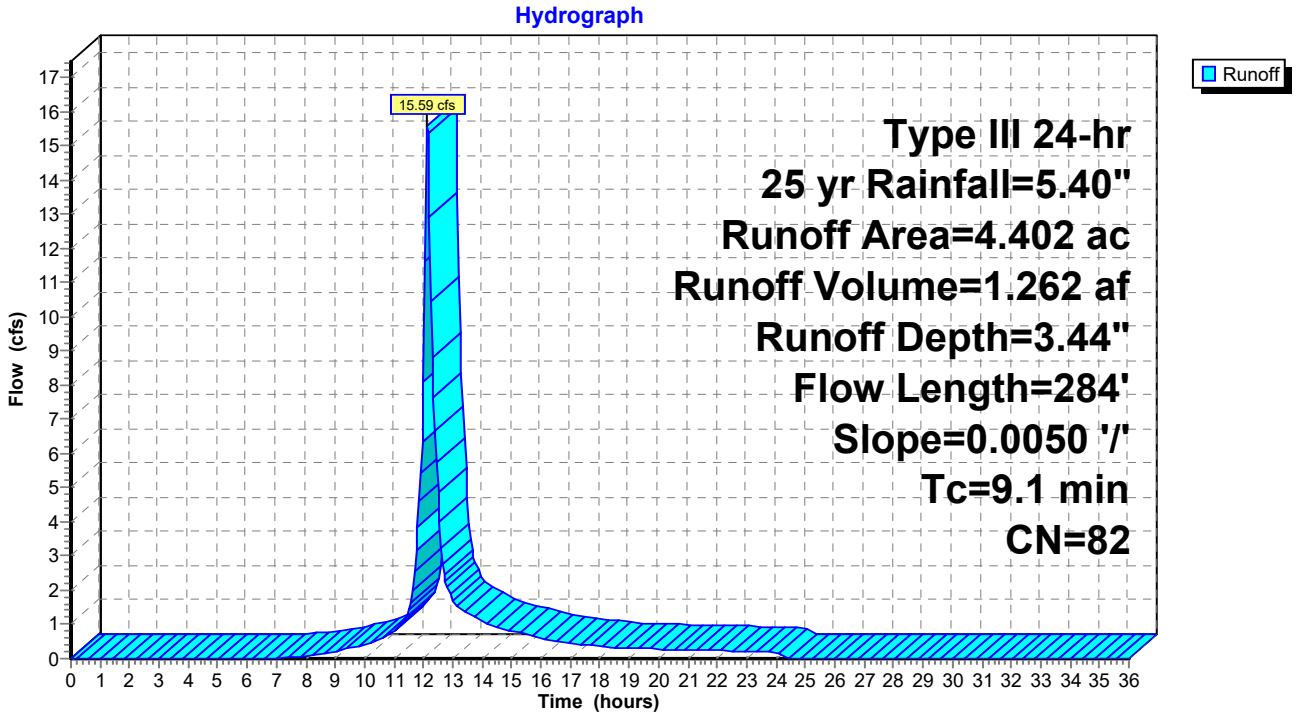
Runoff = 15.59 cfs @ 12.13 hrs, Volume= 1.262 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
1.892	61	>75% Grass cover, Good, HSG B
2.510	98	Paved parking, HSG B
4.402	82	Weighted Average
1.892		42.98% Pervious Area
2.510		57.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	50	0.0050	0.69		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
7.9	234	0.0050	0.49		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
9.1	284	Total			

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-1A: PR-1A

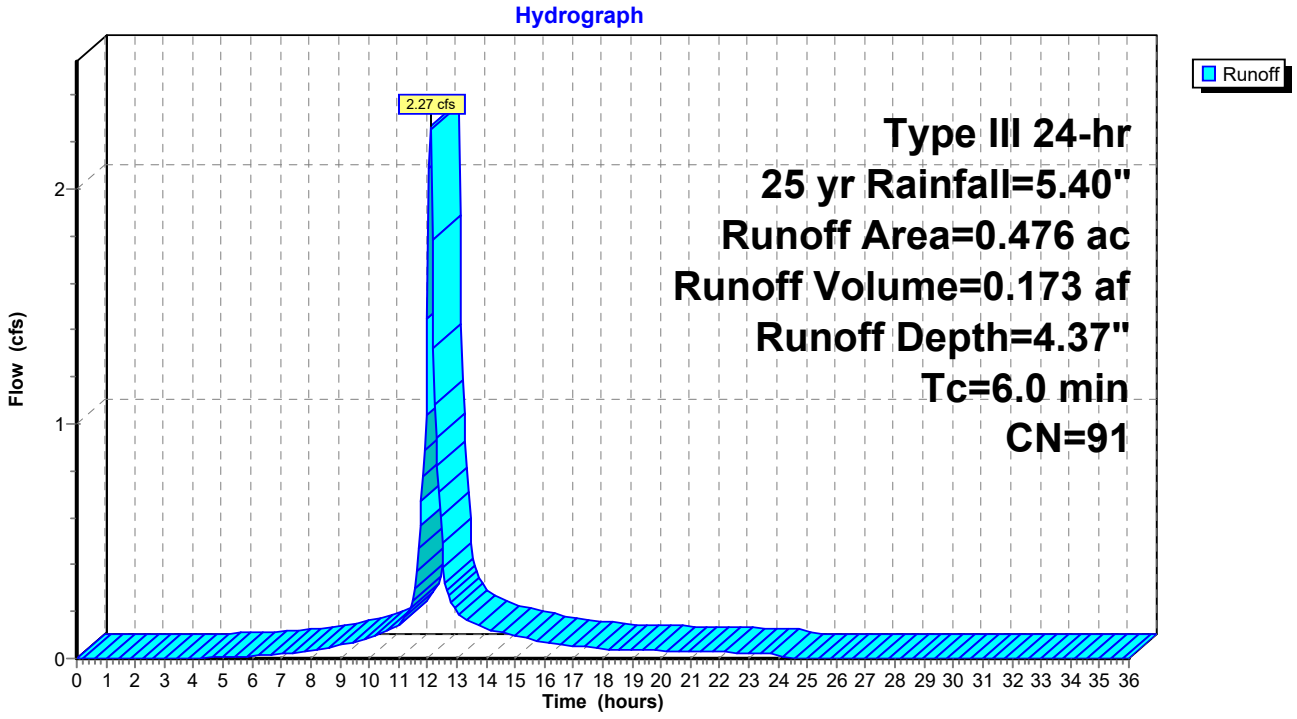
Runoff = 2.27 cfs @ 12.09 hrs, Volume= 0.173 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.090	61	>75% Grass cover, Good, HSG B
0.386	98	Paved parking, HSG B
0.476	91	Weighted Average
0.090		18.91% Pervious Area
0.386		81.09% Impervious Area

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

Subcatchment PR-1A: PR-1A



Summary for Subcatchment PR-1B: PR-1B

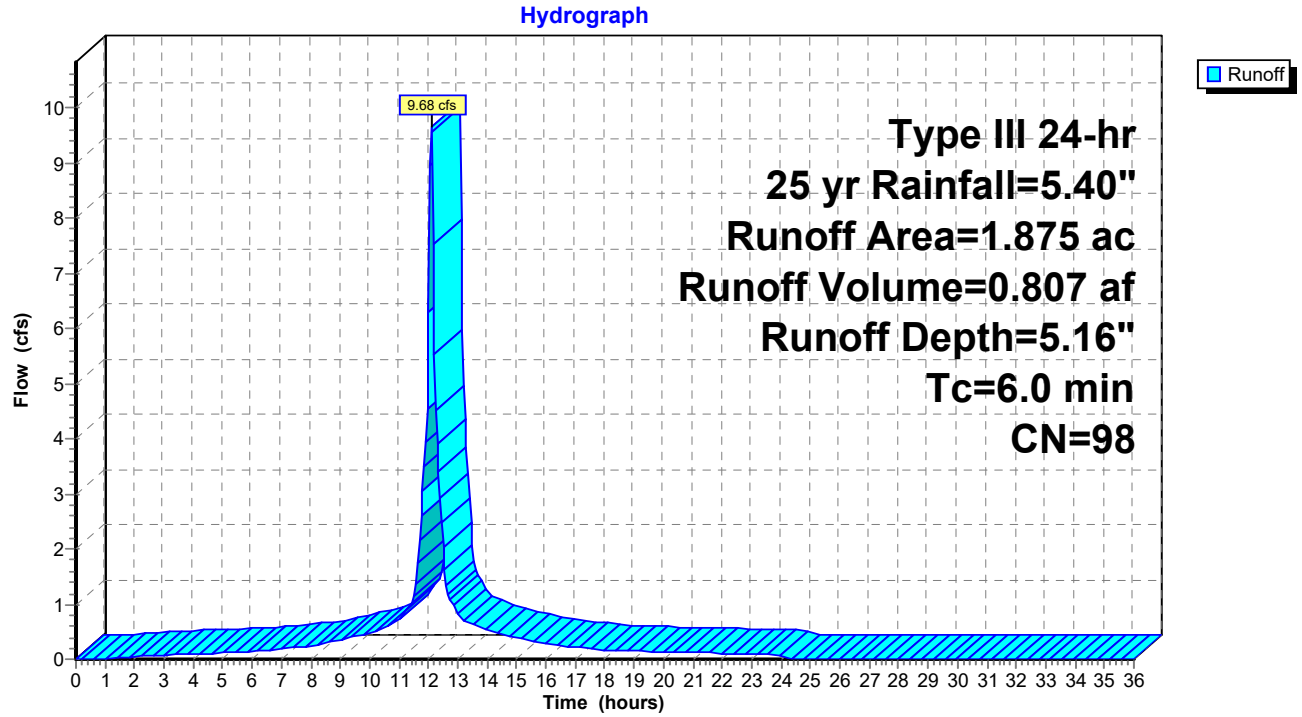
Runoff = 9.68 cfs @ 12.09 hrs, Volume= 0.807 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
1.875	98	Roofs, HSG B
1.875		100.00% Impervious Area

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

Subcatchment PR-1B: PR-1B



Summary for Subcatchment PR-1C: PR-1C

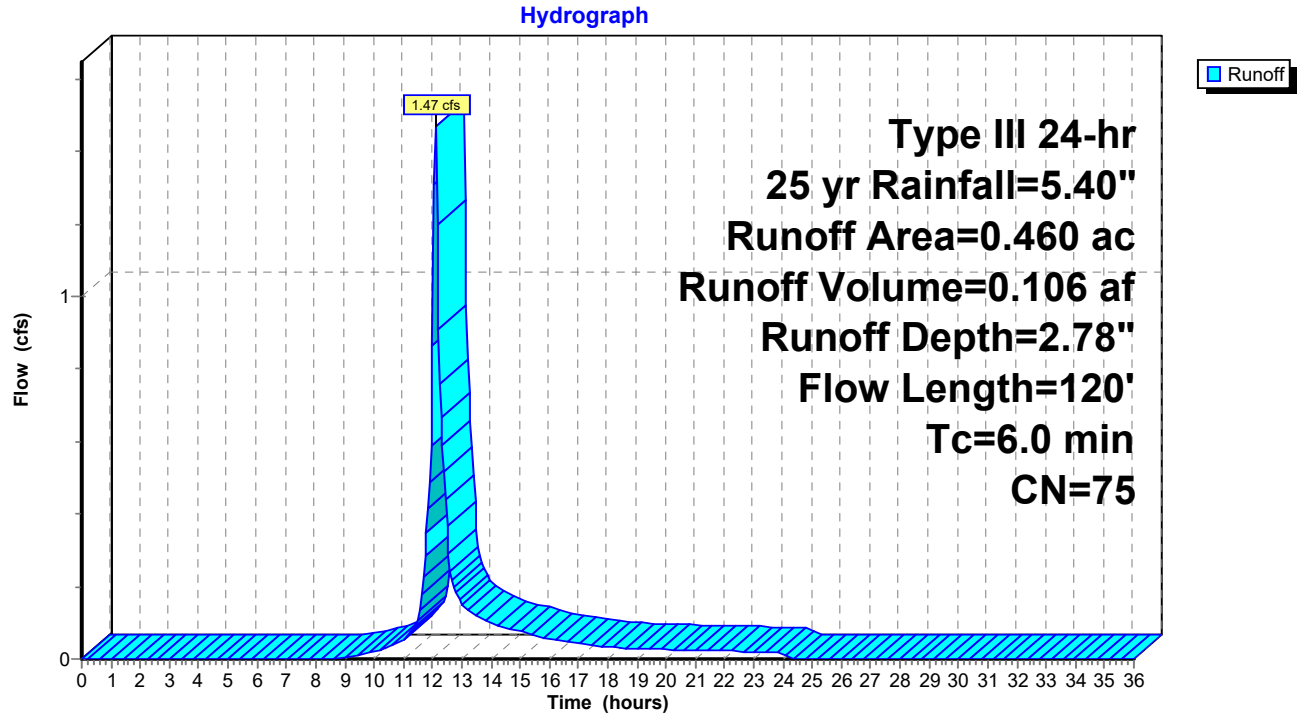
Runoff = 1.47 cfs @ 12.09 hrs, Volume= 0.106 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.020	55	Woods, Good, HSG B
0.260	61	>75% Grass cover, Good, HSG B
0.180	98	Paved parking, HSG B
0.460	75	Weighted Average
0.280		60.87% Pervious Area
0.180		39.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		**Sheet Flow, 20' SF** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	40	0.5000	0.35		**Sheet Flow, 30' SF** Grass: Dense n= 0.240 P2= 3.20"
0.1	12	0.0100	1.61		**Shallow Concentrated Flow, 12' SCF** Unpaved Kv= 16.1 fps
0.2	48	0.0400	4.06		**Shallow Concentrated Flow, 48' SCF** Paved Kv= 20.3 fps
5.8	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-1C: PR-1C



Summary for Subcatchment PR-1D: PR-1D

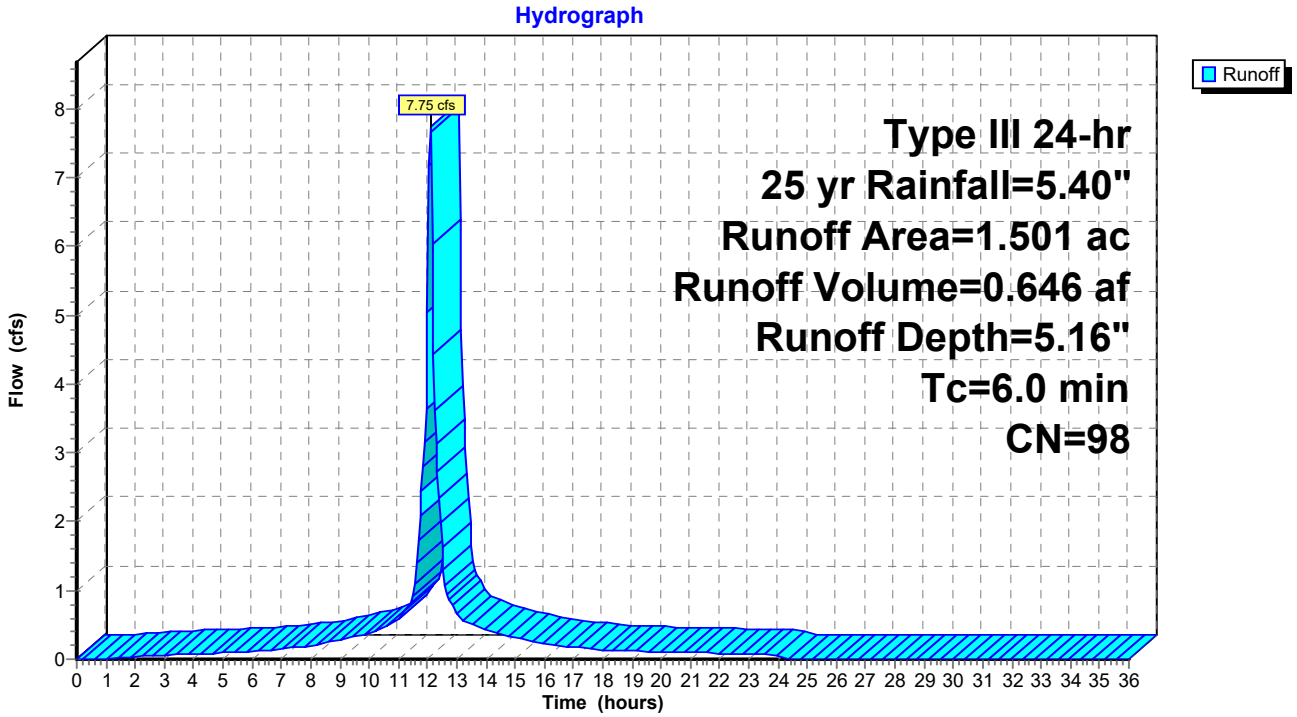
Runoff = 7.75 cfs @ 12.09 hrs, Volume= 0.646 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
1.501	98	Roofs, HSG B
1.501		100.00% Impervious Area

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

Subcatchment PR-1D: PR-1D



Summary for Subcatchment PR-1E: PR-1E

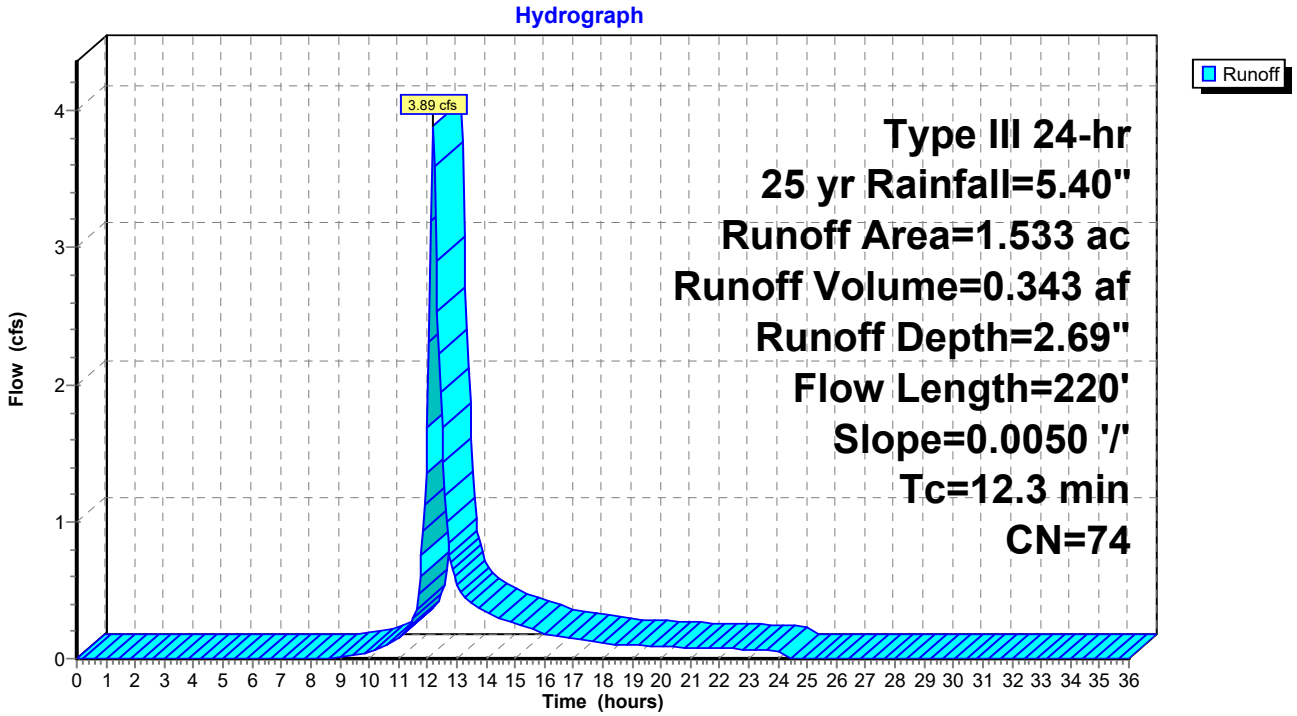
Runoff = 3.89 cfs @ 12.17 hrs, Volume= 0.343 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.533	98	Paved parking, HSG B
1.533	74	Weighted Average
1.000		65.23% Pervious Area
0.533		34.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
2.5	170	0.0050	1.14		**Shallow Concentrated Flow, 170' SCF** Unpaved Kv= 16.1 fps
12.3	220	Total			

Subcatchment PR-1E: PR-1E



Summary for Subcatchment PR-2: PR-2

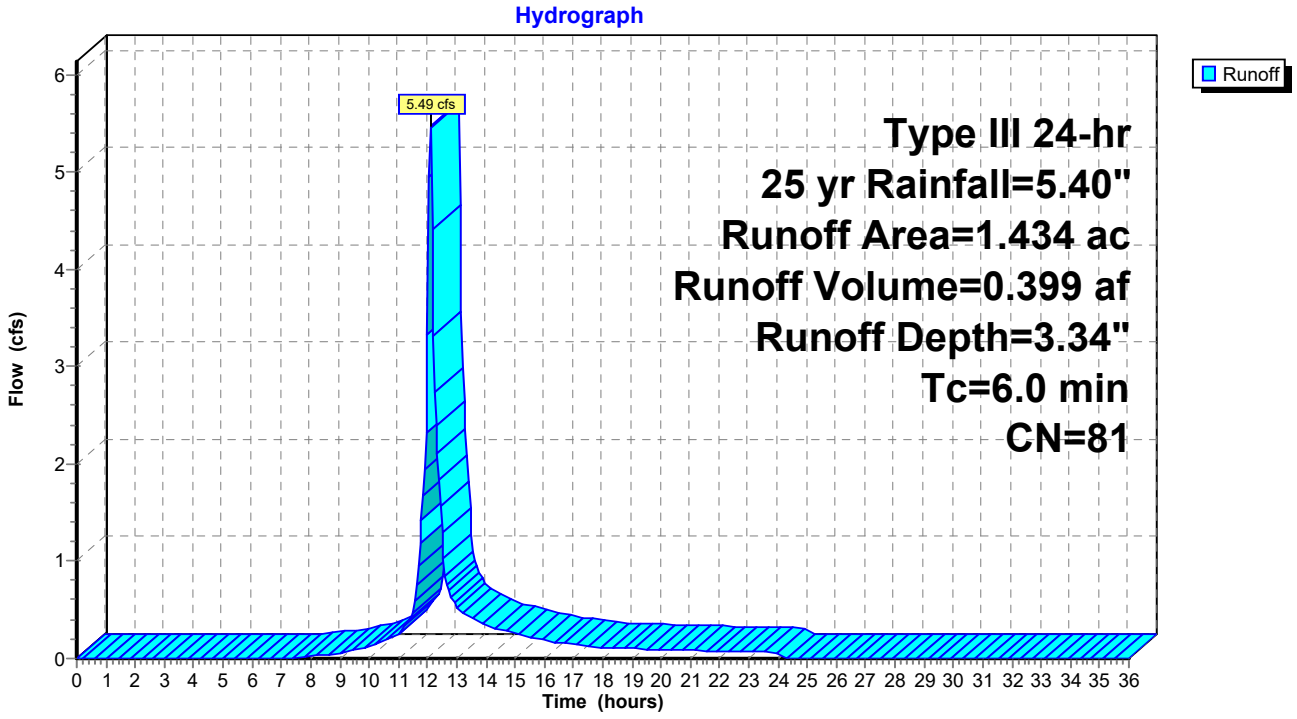
Runoff = 5.49 cfs @ 12.09 hrs, Volume= 0.399 af, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.672	61	>75% Grass cover, Good, HSG B
0.762	98	Paved parking, HSG B
1.434	81	Weighted Average
0.672		46.86% Pervious Area
0.762		53.14% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-2A: PR-2B

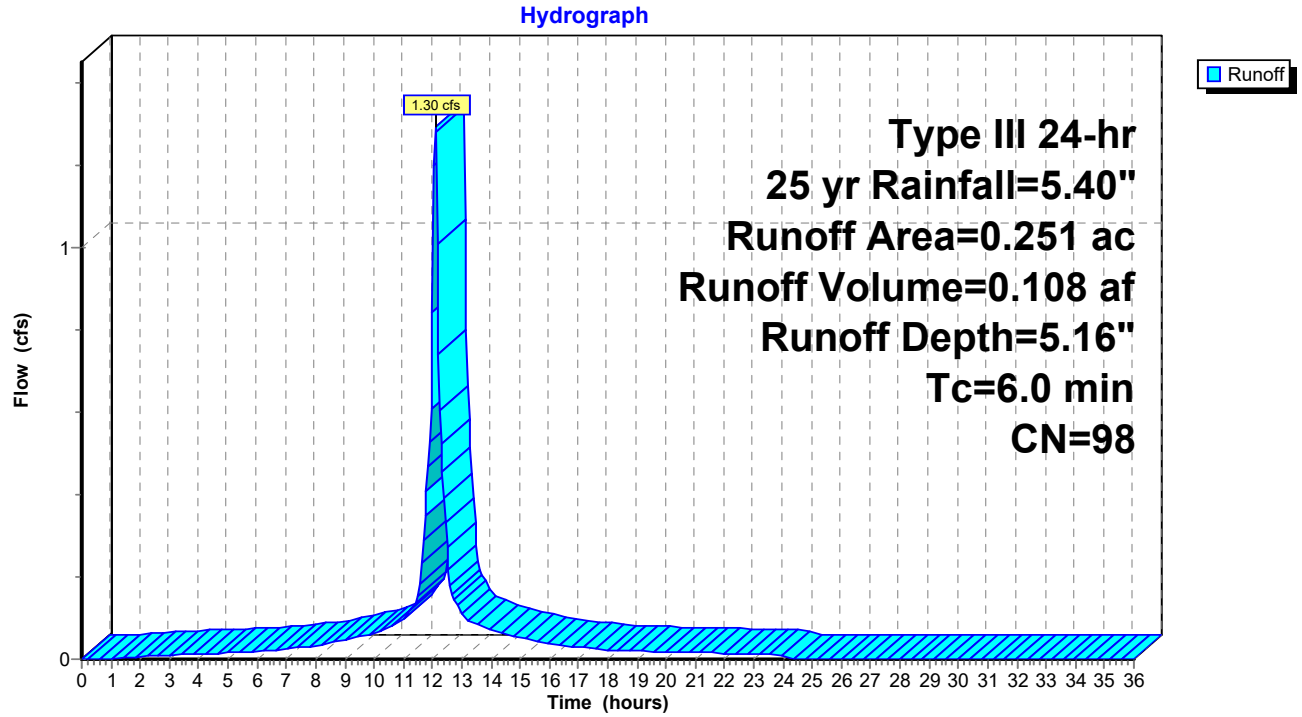
Runoff = 1.30 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.251	98	Roofs, HSG B
0.251		100.00% Impervious Area

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

Subcatchment PR-2A: PR-2B



Summary for Subcatchment PR-3A: PR-3A

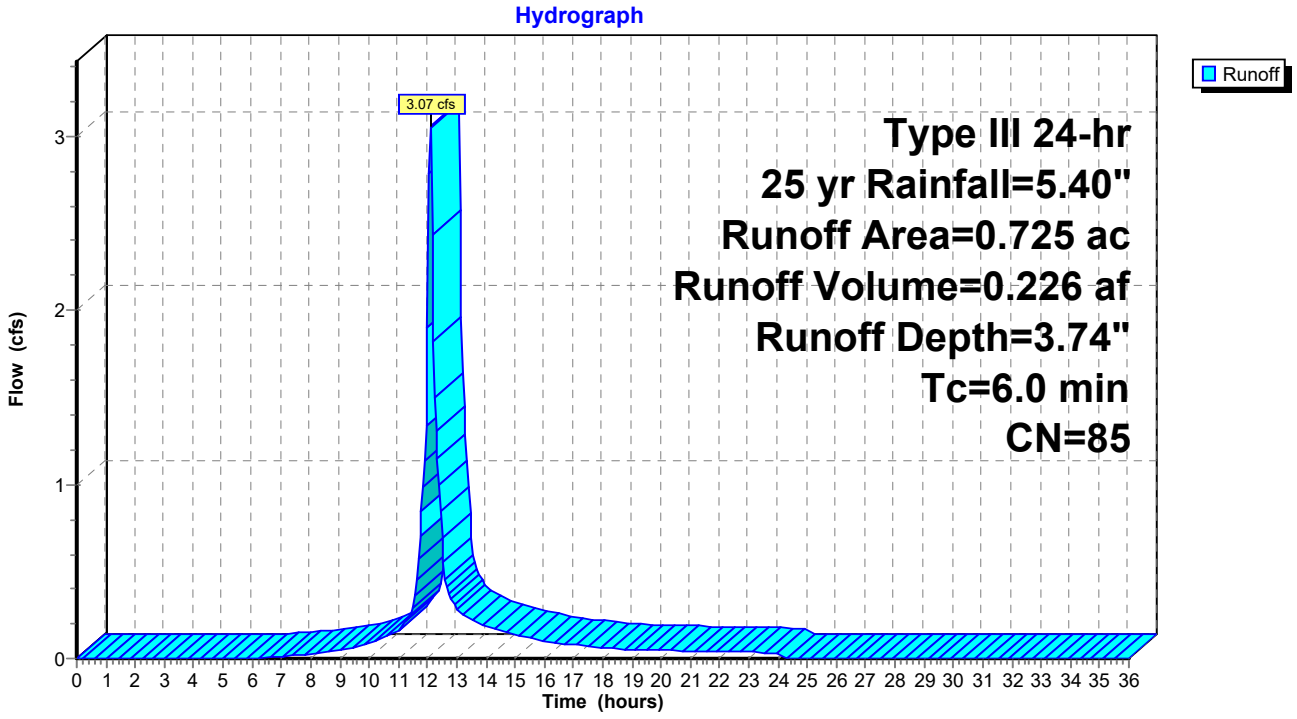
Runoff = 3.07 cfs @ 12.09 hrs, Volume= 0.226 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.249	61	>75% Grass cover, Good, HSG B
0.476	98	Paved parking, HSG B
0.725	85	Weighted Average
0.249		34.34% Pervious Area
0.476		65.66% Impervious Area

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

Subcatchment PR-3A: PR-3A



Summary for Subcatchment PR-3B: PR-3B

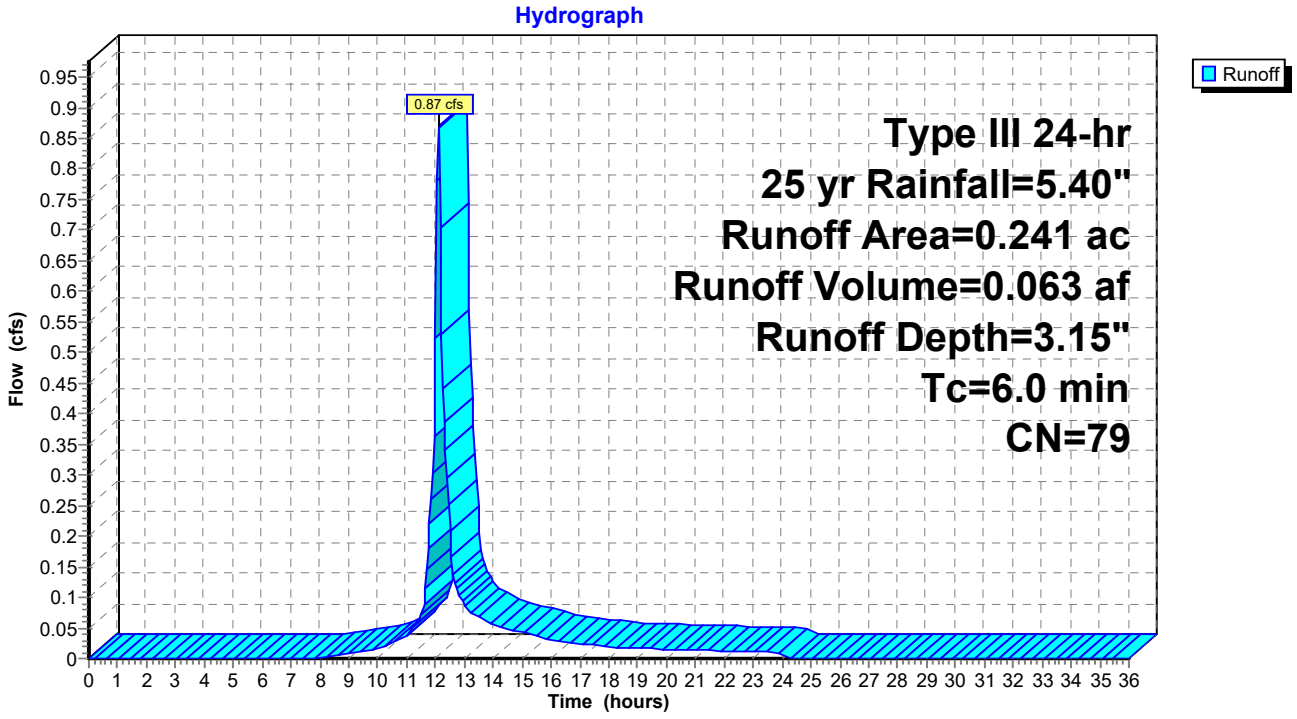
Runoff = 0.87 cfs @ 12.09 hrs, Volume= 0.063 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.124	61	>75% Grass cover, Good, HSG B
0.117	98	Paved parking, HSG B
0.241	79	Weighted Average
0.124		51.45% Pervious Area
0.117		48.55% Impervious Area

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

Subcatchment PR-3B: PR-3B



Summary for Subcatchment PR-3C: PR-3C

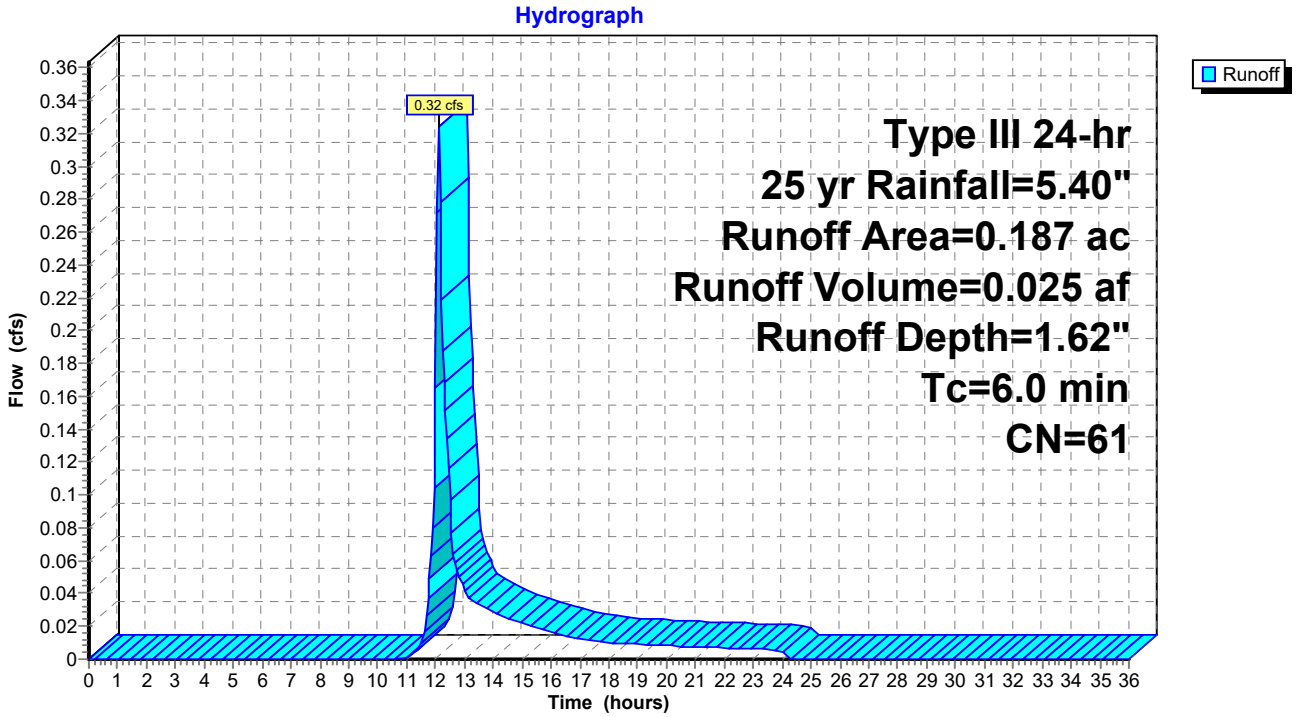
Runoff = 0.32 cfs @ 12.10 hrs, Volume= 0.025 af, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Description
0.187	61	>75% Grass cover, Good, HSG B
0.187		100.00% Pervious Area

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

Subcatchment PR-3C: PR-3C



Summary for Subcatchment PR-4A: PR-5A

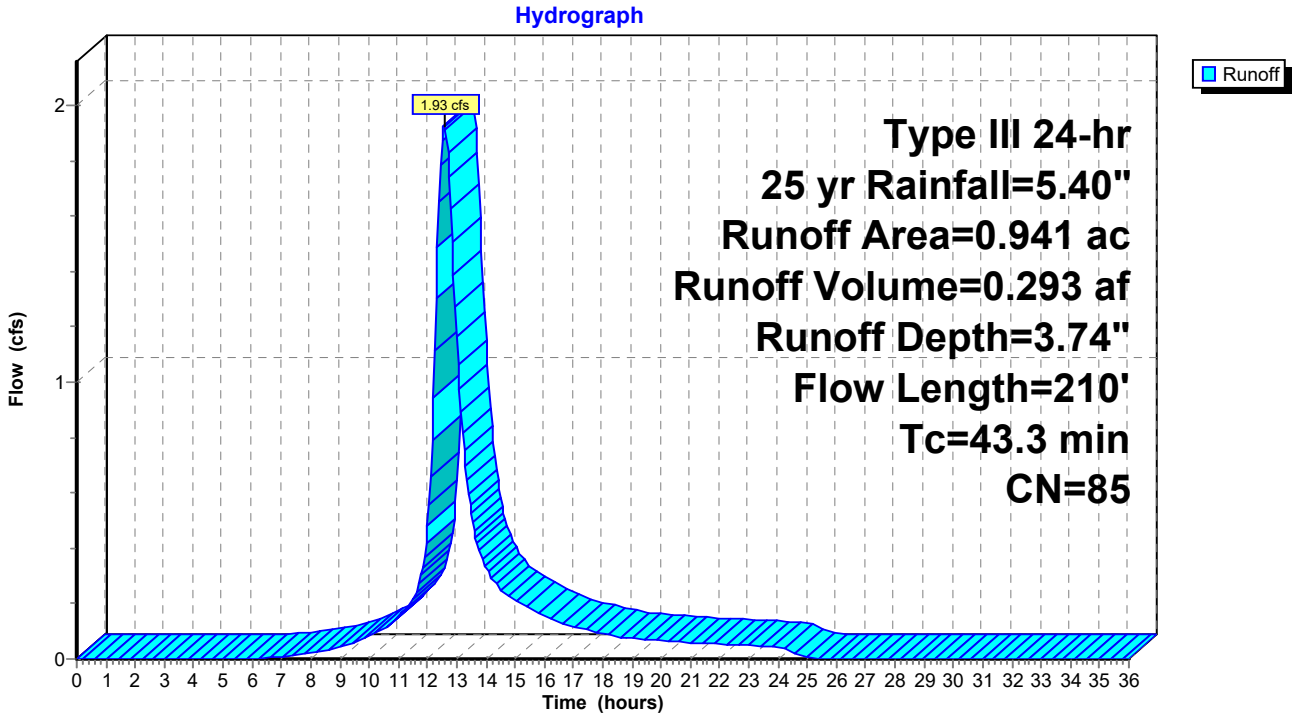
Runoff = 1.93 cfs @ 12.58 hrs, Volume= 0.293 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (ac)	CN	Description
*	0.941	85	SYNTHETIC TURF- PAD- LINER
	0.941		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	110	0.0055	0.05		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
43.3	210	Total			

Subcatchment PR-4A: PR-5A



Summary for Subcatchment PR-4B: SB 11 A

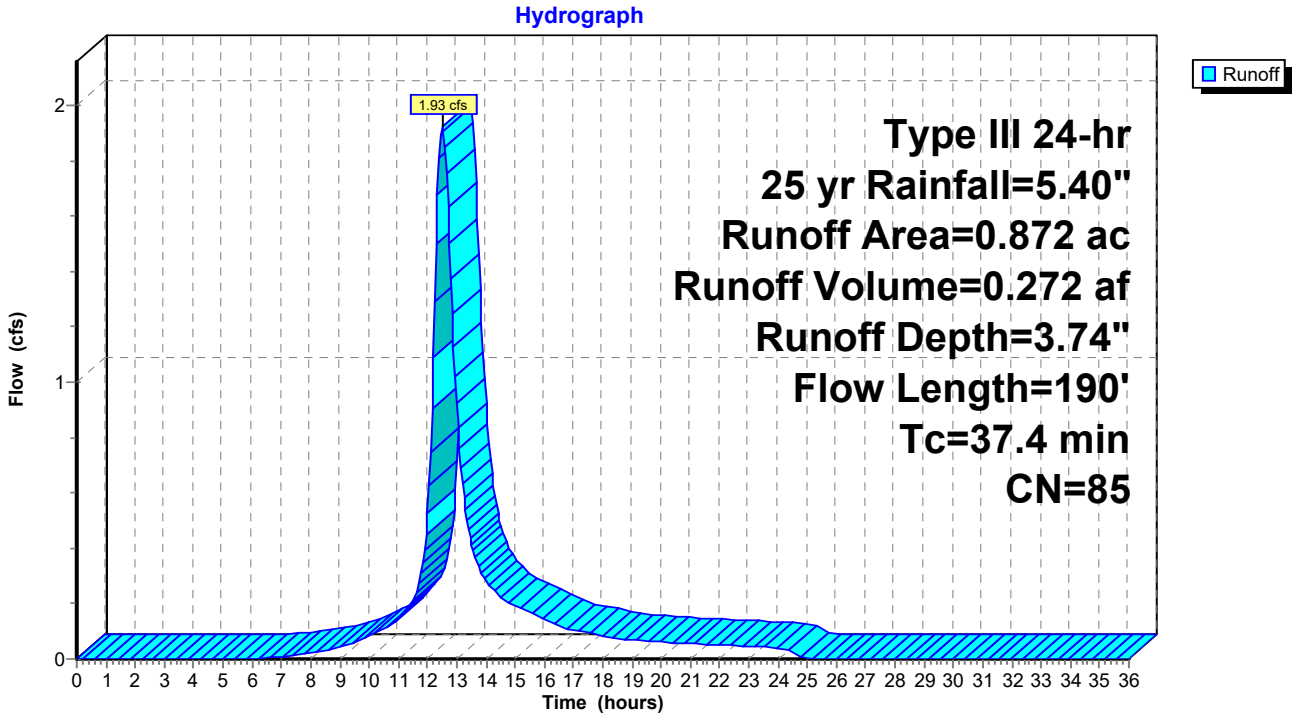
Runoff = 1.93 cfs @ 12.51 hrs, Volume= 0.272 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (ac)	CN	Description
*	0.872	85	SYNTHETIC TURF- PAD- LINER
	0.872		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	90	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
37.4	190	Total			

Subcatchment PR-4B: SB 11 A



Summary for Subcatchment PR-4C: SB 00 DPW SLOPE

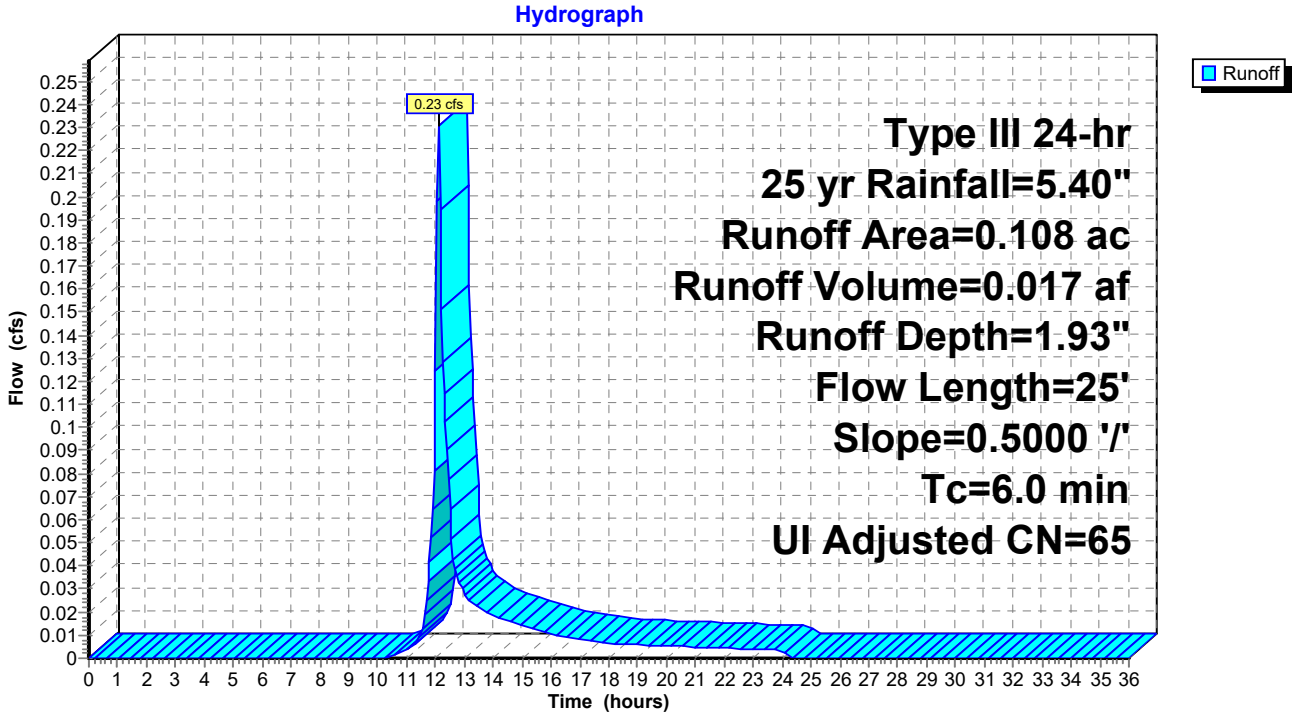
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (ac)	CN	Adj	Description
0.025	98		Unconnected pavement, HSG B
0.083	61		>75% Grass cover, Good, HSG B
0.108	70	65	Weighted Average, UI Adjusted
0.083			76.85% Pervious Area
0.025			23.15% Impervious Area
0.025			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	25	0.5000	0.32		**Sheet Flow, SLOPING LAND** Grass: Dense n= 0.240 P2= 3.20"
1.3	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-4C: SB 00 DPW SLOPE



Summary for Subcatchment PR-5A: BB 01 A

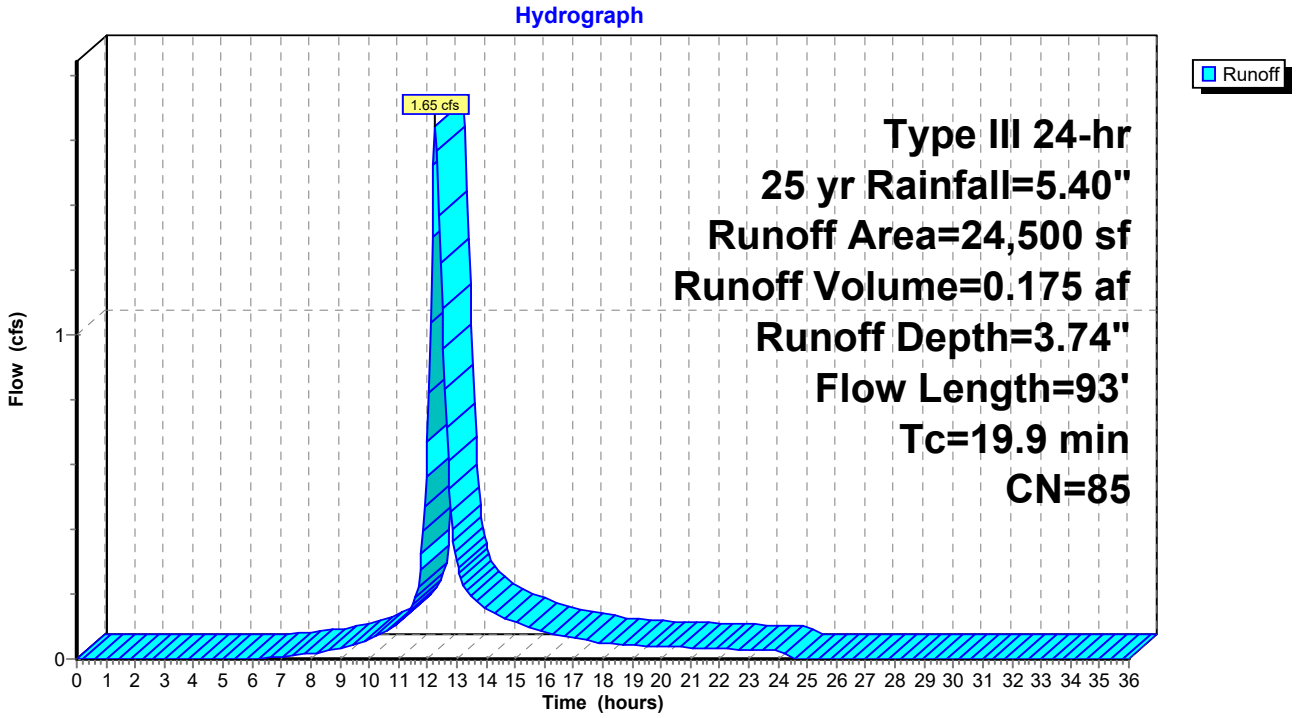
Runoff = 1.65 cfs @ 12.27 hrs, Volume= 0.175 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	24,500	85	SYNTHETIC TURF- PAD- LINER
	24,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	46	0.0067	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
19.9	93	Total			

Subcatchment PR-5A: BB 01 A



Summary for Subcatchment PR-5B: BB 11 A

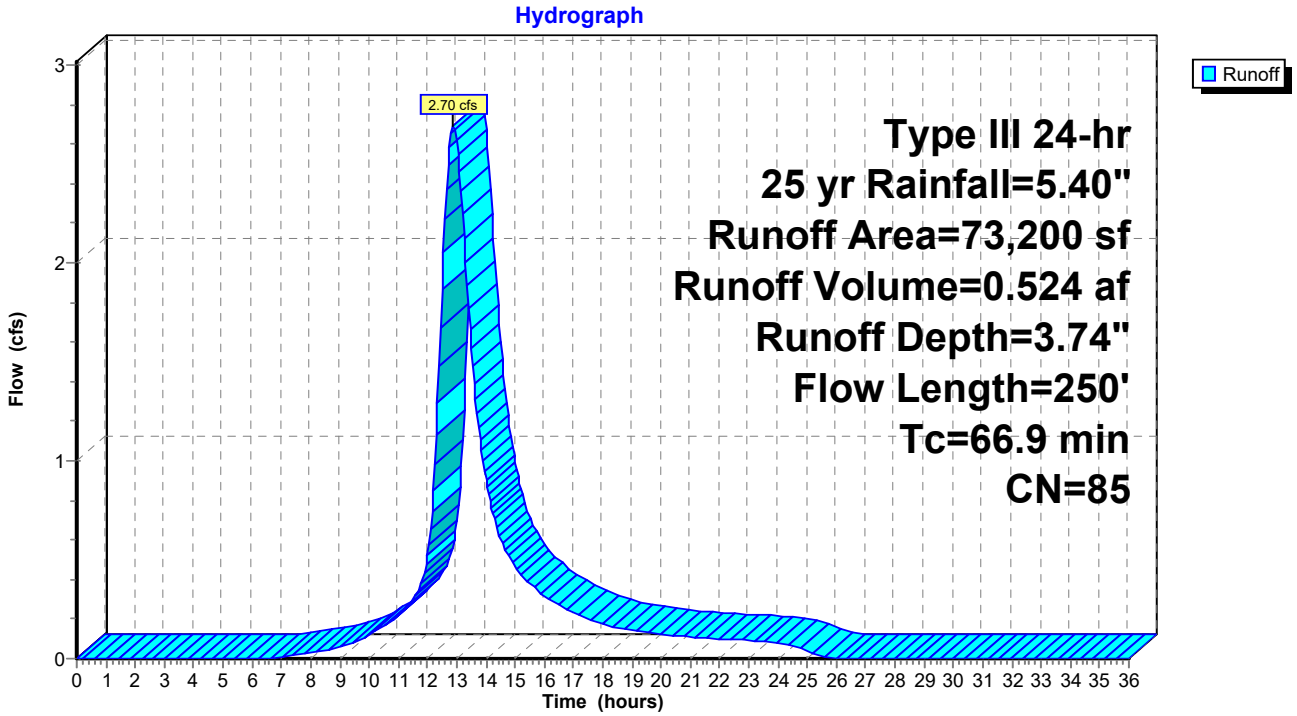
Runoff = 2.70 cfs @ 12.87 hrs, Volume= 0.524 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	73,200	85	SYNTHETIC TURF- PAD- LINER
	73,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	53	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
43.1	150	0.0083	0.06		**Sheet Flow, SYNTHETIC TURF** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
66.9	250	Total			

Subcatchment PR-5B: BB 11 A



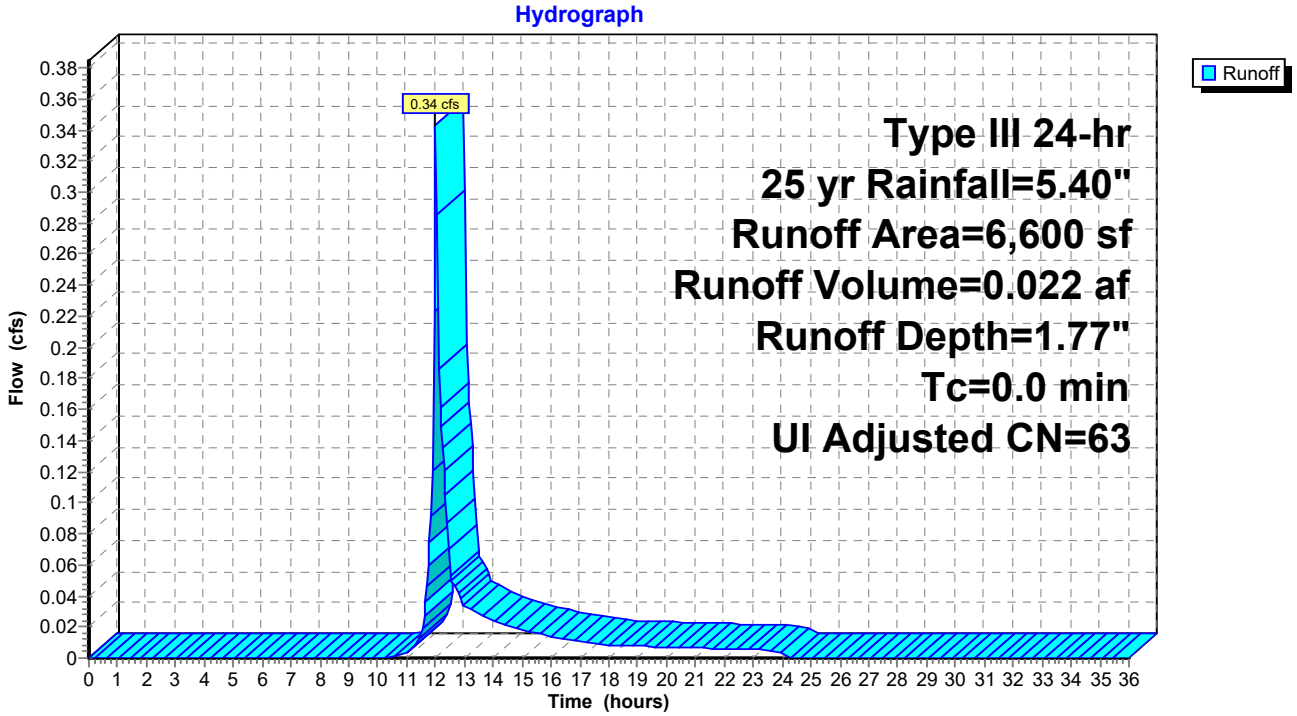
Summary for Subcatchment PR-5C: SLOPE

Runoff = 0.34 cfs @ 12.01 hrs, Volume= 0.022 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Adj	Description
600	98		Unconnected roofs, HSG B
6,000	61		>75% Grass cover, Good, HSG B
6,600	64	63	Weighted Average, UI Adjusted
6,000			90.91% Pervious Area
600			9.09% Impervious Area
600			100.00% Unconnected

Subcatchment PR-5C: SLOPE



Summary for Pond 1P: rain garden#1 cascading

Inflow Area = 0.725 ac, 65.66% Impervious, Inflow Depth = 3.74" for 25 yr event
Inflow = 3.07 cfs @ 12.09 hrs, Volume= 0.226 af
Outflow = 2.85 cfs @ 12.11 hrs, Volume= 0.224 af, Atten= 7%, Lag= 1.4 min
Primary = 2.75 cfs @ 12.12 hrs, Volume= 0.223 af
Secondary = 0.11 cfs @ 12.10 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 62.02' @ 12.12 hrs Surf.Area= 507 sf Storage= 563 cf
Flood Elev= 63.00' Surf.Area= 660 sf Storage= 1,132 cf

Plug-Flow detention time= 39.9 min calculated for 0.224 af (99% of inflow)
Center-of-Mass det. time= 35.5 min (840.1 - 804.6)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,048 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 1,348 cf Overall - 300 cf Embedded = 1,048 cf
#2	58.50'	30 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 75 cf Overall x 40.0% Voids
#3	59.00'	50 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 199 cf Overall x 25.0% Voids
#4	60.33'	5 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 26 cf Overall x 20.0% Voids
		1,132 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
60.50	150	300	300
61.00	236	97	397
62.00	503	370	766
63.00	660	582	1,348

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
59.00	150	75	75

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	150	0	0
60.33	150	199	199

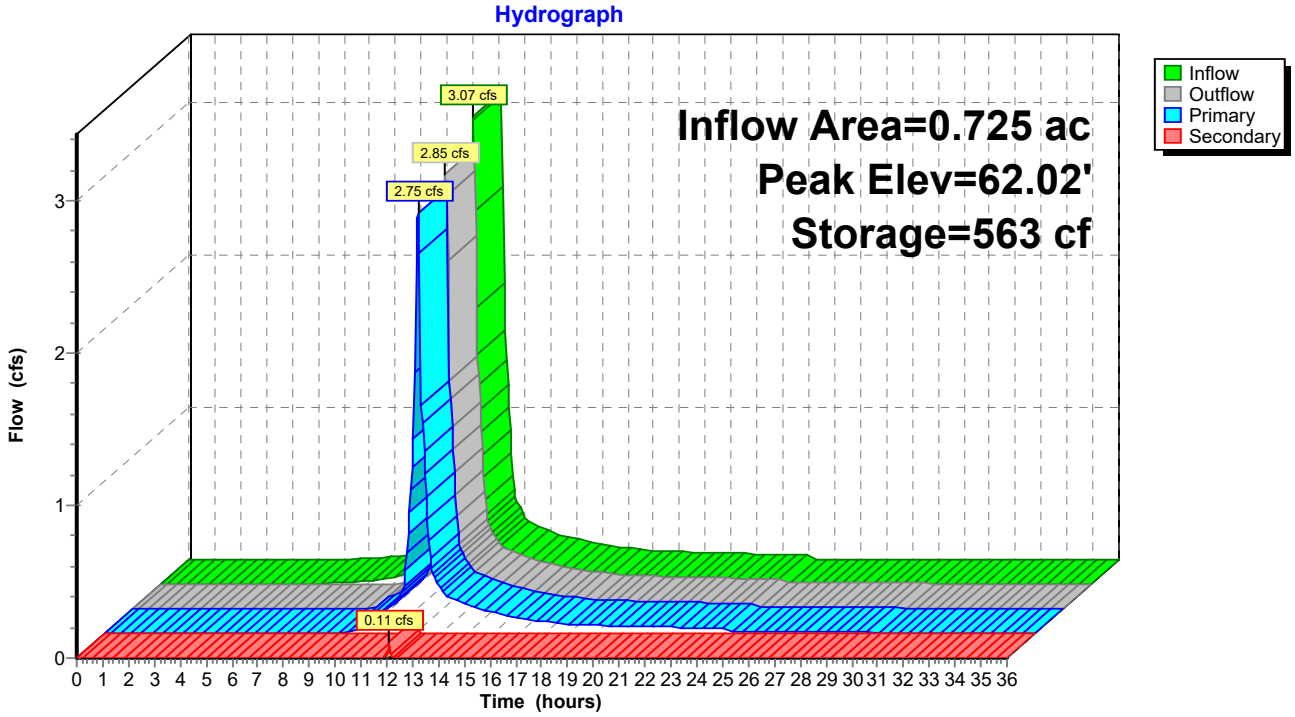
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.33	150	0	0
60.50	150	26	26

Device	Routing	Invert	Outlet Devices
#1	Device 3	58.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	62.00'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	58.50'	**8.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 58.50' / 58.40' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#4	Device 3	61.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.71 cfs @ 12.12 hrs HW=62.01' TW=54.38' (Dynamic Tailwater)
└─**3=Culvert** (Passes 2.71 cfs of 3.00 cfs potential flow)
  └─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 2.70 cfs @ 3.44 fps)

Secondary OutFlow Max=0.10 cfs @ 12.10 hrs HW=62.01' TW=54.35' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.29 fps)

Pond 1P: rain garden#1 cascading



Summary for Pond 2P: rain garden#2 cascading

Inflow Area = 0.966 ac, 61.39% Impervious, Inflow Depth > 3.57" for 25 yr event
Inflow = 3.71 cfs @ 12.11 hrs, Volume= 0.287 af
Outflow = 3.19 cfs @ 12.17 hrs, Volume= 0.280 af, Atten= 14%, Lag= 3.9 min
Primary = 3.19 cfs @ 12.17 hrs, Volume= 0.280 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 54.45' @ 12.17 hrs Surf.Area= 978 sf Storage= 1,150 cf
Flood Elev= 55.00' Surf.Area= 1,326 sf Storage= 1,784 cf

Plug-Flow detention time= 58.3 min calculated for 0.280 af (97% of inflow)
Center-of-Mass det. time= 37.4 min (873.3 - 835.9)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	1,557 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 2,357 cf Overall - 800 cf Embedded = 1,557 cf
#2	51.00'	80 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 200 cf Overall x 40.0% Voids
#3	51.50'	133 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 532 cf Overall x 25.0% Voids
#4	52.83'	14 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 68 cf Overall x 20.0% Voids
		1,784 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
53.00	400	800	800
54.00	694	547	1,347
55.00	1,326	1,010	2,357

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
51.50	400	200	200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	400	0	0
52.83	400	532	532

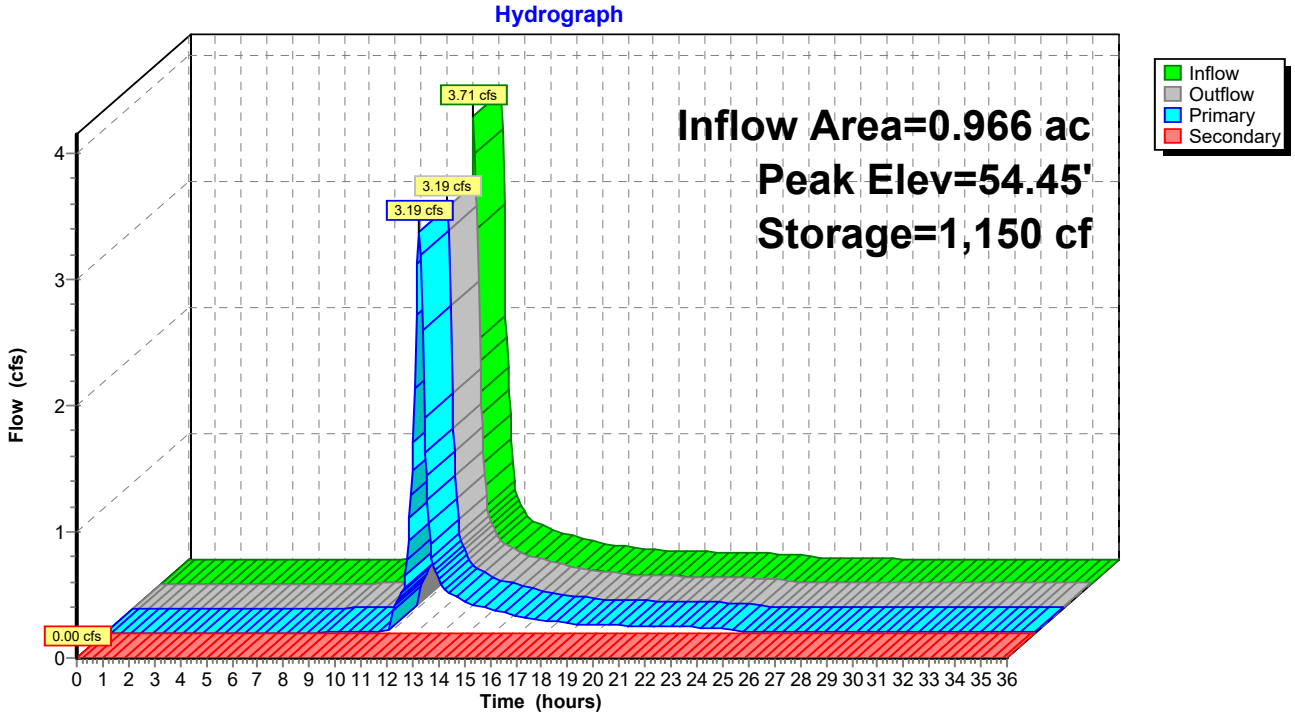
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
52.83	400	0	0
53.00	400	68	68

Device	Routing	Invert	Outlet Devices
#1	Device 3	51.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	54.50'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	51.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 51.00' / 50.88' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#4	Device 3	53.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.16 cfs @ 12.17 hrs HW=54.44' TW=48.95' (Dynamic Tailwater)
└─**3=Culvert** (Passes 3.16 cfs of 6.48 cfs potential flow)
  └─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 3.13 cfs @ 3.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.00' TW=46.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 2P: rain garden#2 cascading



Summary for Pond 3P: rain garden#3 cascading

Inflow Area = 1.153 ac, 51.43% Impervious, Inflow Depth > 3.18" for 25 yr event
Inflow = 3.45 cfs @ 12.16 hrs, Volume= 0.305 af
Outflow = 3.44 cfs @ 12.17 hrs, Volume= 0.291 af, Atten= 0%, Lag= 0.6 min
Primary = 3.44 cfs @ 12.17 hrs, Volume= 0.291 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.95' @ 12.17 hrs Surf.Area= 938 sf Storage= 1,068 cf
Flood Elev= 50.00' Surf.Area= 1,373 sf Storage= 2,283 cf

Plug-Flow detention time= 76.4 min calculated for 0.290 af (95% of inflow)
Center-of-Mass det. time= 34.2 min (906.9 - 872.8)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	1,944 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 3,144 cf Overall - 1,200 cf Embedded = 1,944 cf
#2	46.00'	120 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 300 cf Overall x 40.0% Voids
#3	46.50'	199 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 798 cf Overall x 25.0% Voids
#4	47.83'	20 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 102 cf Overall x 20.0% Voids
		2,283 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
48.00	600	1,200	1,200
49.00	957	779	1,979
50.00	1,373	1,165	3,144

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
46.50	600	300	300

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.50	600	0	0
47.83	600	798	798

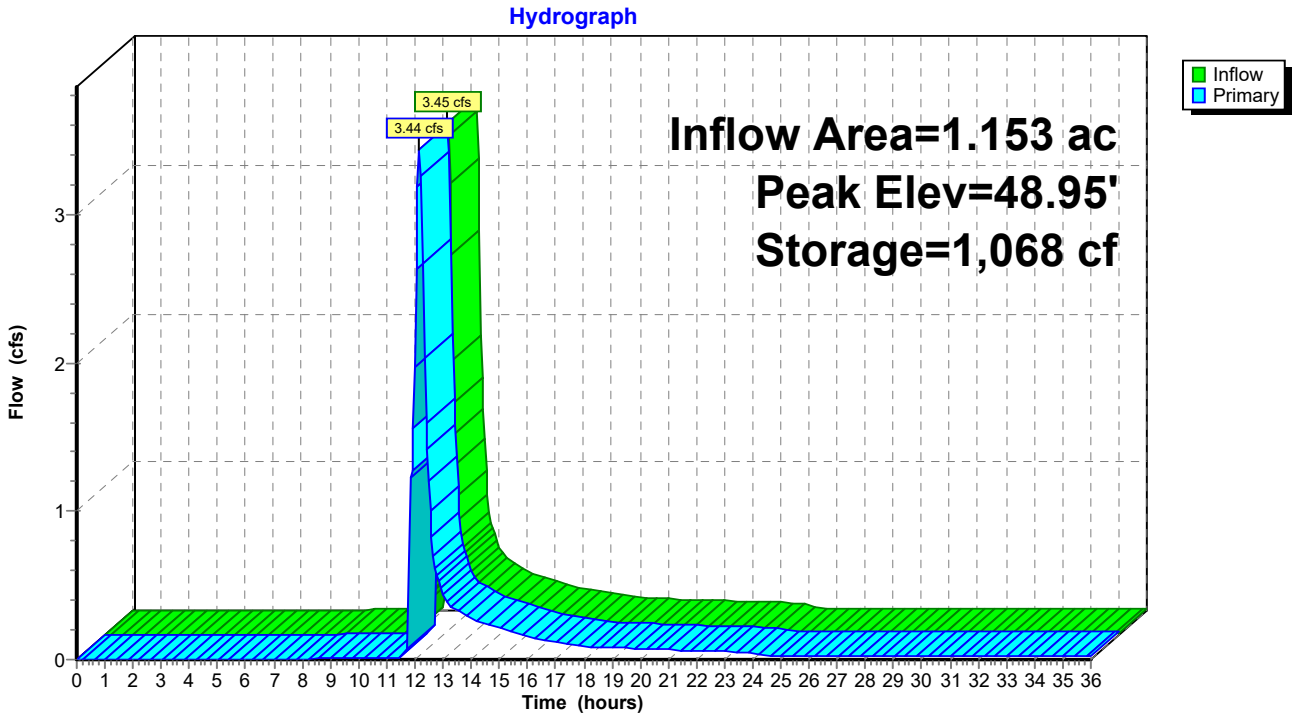
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.83	600	0	0
48.00	600	102	102

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	48.75'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#3 Primary 46.00' **15.0" Round Culvert**
L= 26.0' CPP, projecting, no headwall, Ke= 0.900
Inlet / Outlet Invert= 46.00' / 45.87' S= 0.0050 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.41 cfs @ 12.17 hrs HW=48.95' TW=0.00' (Dynamic Tailwater)
↑**3=Culvert** (Passes 3.41 cfs of 7.11 cfs potential flow)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)
2=Orifice/Grate (Weir Controls 3.39 cfs @ 1.45 fps)

Pond 3P: rain garden#3 cascading



Summary for Pond 4P: UGS-1

Inflow Area = 1.685 ac, 60.12% Impervious, Inflow Depth = 3.61" for 25 yr event
Inflow = 6.78 cfs @ 12.09 hrs, Volume= 0.507 af
Outflow = 5.39 cfs @ 12.16 hrs, Volume= 0.487 af, Atten= 21%, Lag= 4.0 min
Discarded = 0.04 cfs @ 8.30 hrs, Volume= 0.101 af
Primary = 5.35 cfs @ 12.16 hrs, Volume= 0.386 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.29' @ 12.16 hrs Surf.Area= 1,672 sf Storage= 4,180 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 104.6 min (905.8 - 801.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.50'	2,099 cf	**29.92'W x 55.89'L x 5.50'H Field A** 9,196 cf Overall - 3,198 cf Embedded = 5,998 cf x 35.0% Voids
#2A	40.25'	3,198 cf	**ADS_StormTech MC-3500 d +Cap** x 28 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 28 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		5,297 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	39.50'	**24.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 39.50' / 39.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	43.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	39.50'	**1.020 in/hr Exfiltration over Surface area**
#4	Device 1	41.83'	**8.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 8.30 hrs HW=39.56' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=5.31 cfs @ 12.16 hrs HW=43.27' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 5.31 cfs of 25.19 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 5.31 cfs @ 5.07 fps)

Pond 4P: UGS-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

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

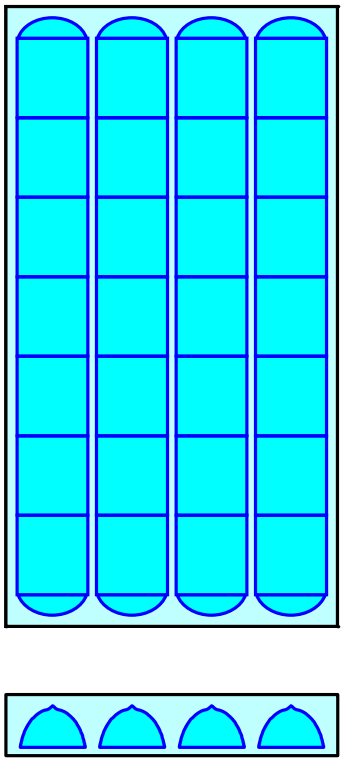
7 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 53.89' Row Length +12.0" End Stone x 2 = 55.89' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

28 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 3,197.9 cf Chamber Storage

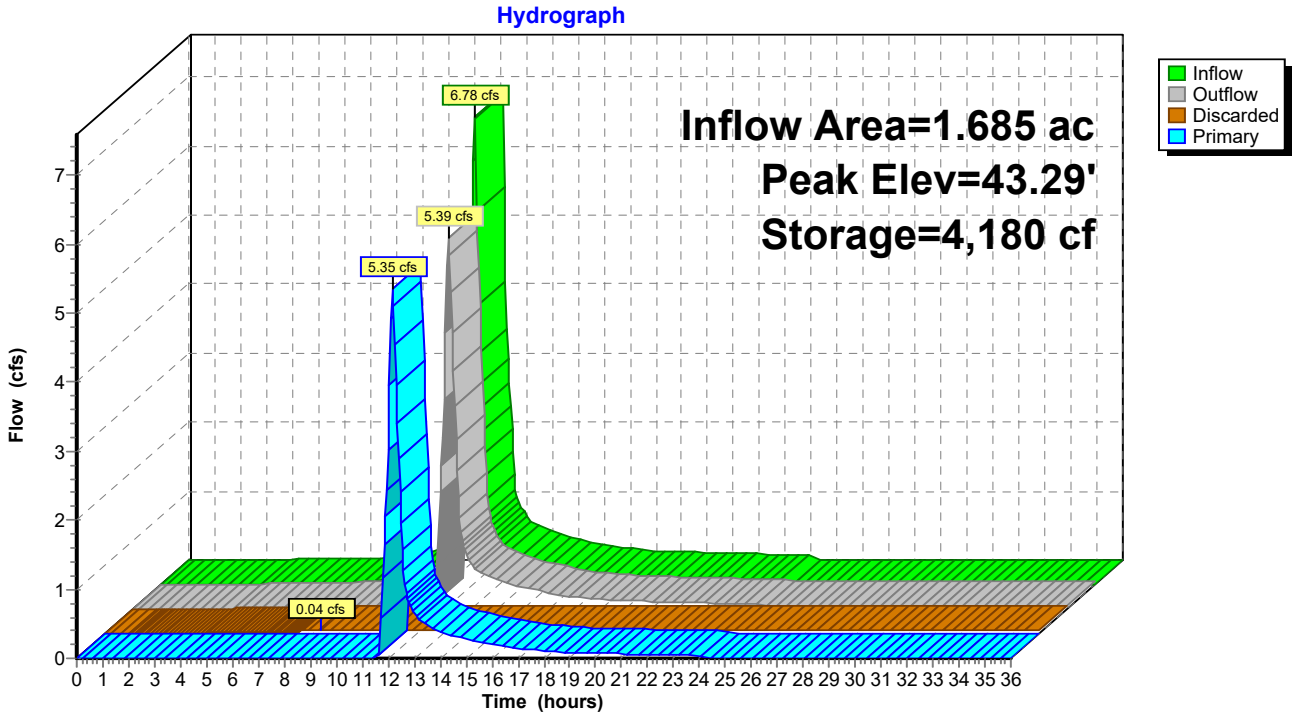
9,196.2 cf Field - 3,197.9 cf Chambers = 5,998.4 cf Stone x 35.0% Voids = 2,099.4 cf Stone Storage

Chamber Storage + Stone Storage = 5,297.3 cf = 0.122 af
Overall Storage Efficiency = 57.6%
Overall System Size = 55.89' x 29.92' x 5.50'

28 Chambers
340.6 cy Field
222.2 cy Stone



Pond 4P: UGS-1


Hydrograph
Inflow Area=1.685 ac
Peak Elev=43.29'
Storage=4,180 cf
6.78 cfs
5.39 cfs
5.35 cfs
0.04 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond BB 01 B: BB 01 B

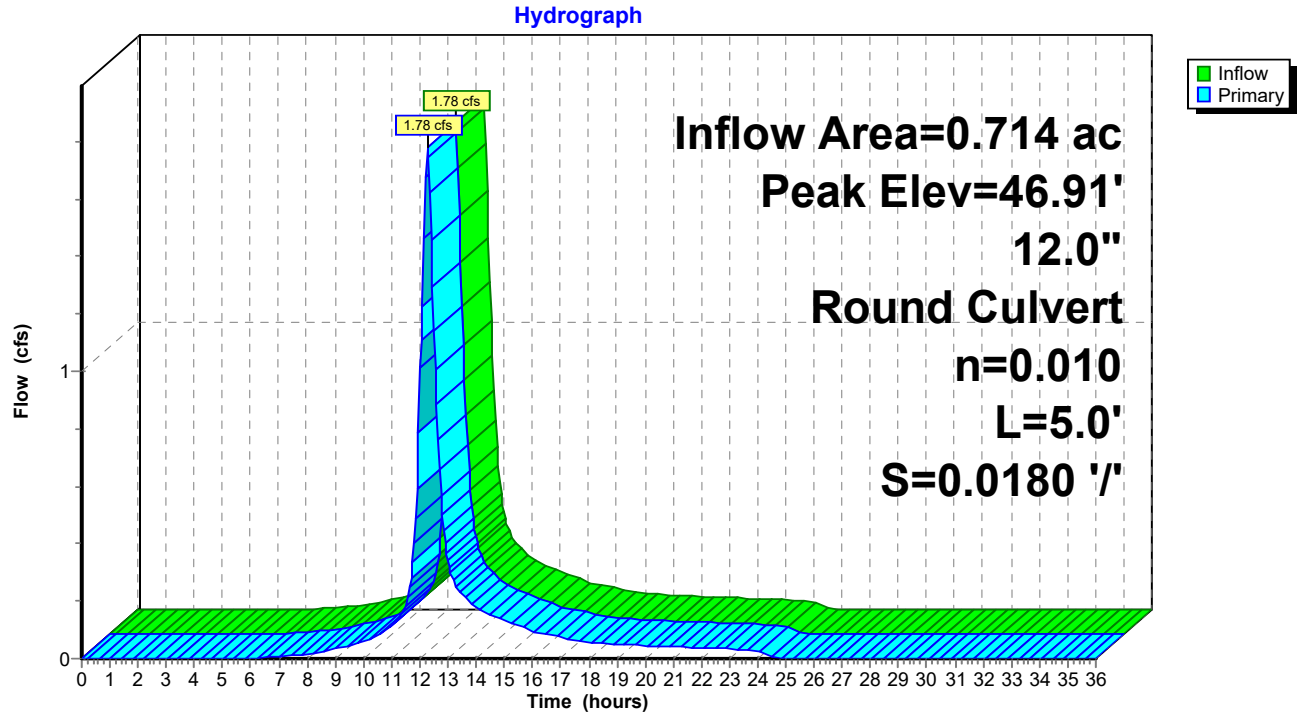
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 3.32" for 25 yr event
Inflow = 1.78 cfs @ 12.26 hrs, Volume= 0.198 af
Outflow = 1.78 cfs @ 12.26 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min
Primary = 1.78 cfs @ 12.26 hrs, Volume= 0.198 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.91' @ 12.59 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.81' S= 0.0180 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.74 cfs @ 12.26 hrs HW=46.72' TW=46.43' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.74 cfs @ 3.43 fps)

Pond BB 01 B: BB 01 B



Summary for Pond BB 01 S: BB 01 S

Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 3.32" for 25 yr event
Inflow = 1.78 cfs @ 12.26 hrs, Volume= 0.198 af
Outflow = 0.91 cfs @ 12.59 hrs, Volume= 0.198 af, Atten= 49%, Lag= 19.5 min
Primary = 0.91 cfs @ 12.59 hrs, Volume= 0.198 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.86' @ 12.59 hrs Surf.Area= 0 sf Storage= 2,045 cf

Plug-Flow detention time= 25.1 min calculated for 0.198 af (100% of inflow)
Center-of-Mass det. time= 24.6 min (846.5 - 821.8)

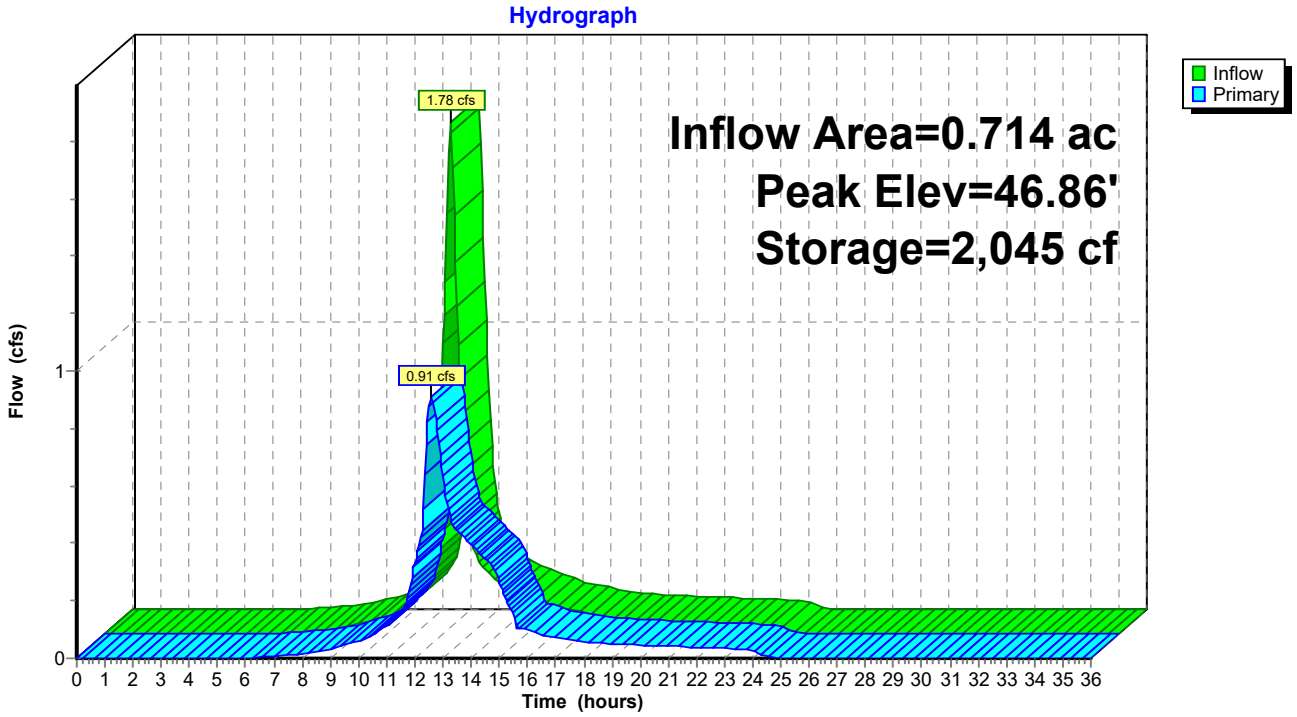
Volume	Invert	Avail.Storage	Storage Description
#1	44.97'	3,256 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.97	0	0
45.30	16	16
45.80	236	252
46.30	825	1,077
46.80	876	1,953
47.30	792	2,745
47.80	511	3,256

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**4.0" Round Culvert** L= 8.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 44.87' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	46.40'	**6.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.30' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Primary OutFlow Max=0.91 cfs @ 12.59 hrs HW=46.86' TW=45.46' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.50 cfs @ 5.69 fps)
2=Culvert (Barrel Controls 0.41 cfs @ 2.86 fps)

Pond BB 01 S: BB 01 S



Summary for Pond BB 06 B: BB 06 B

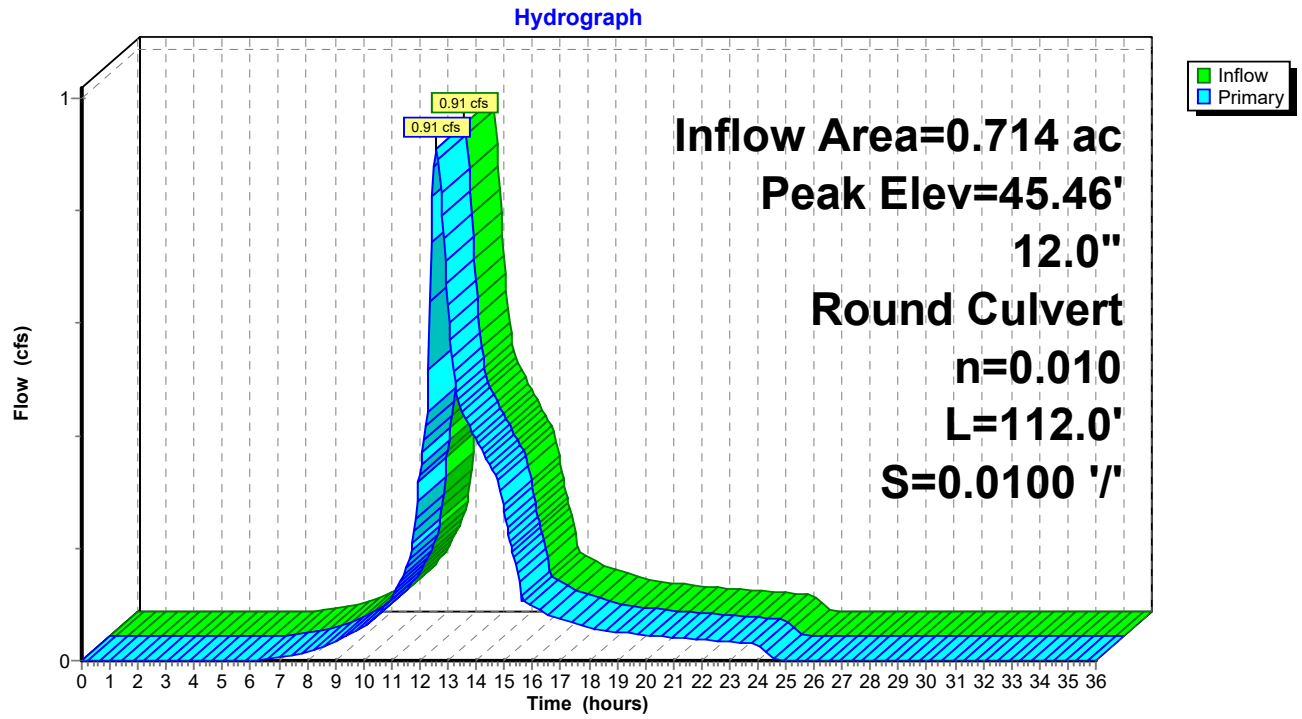
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 3.32" for 25 yr event
Inflow = 0.91 cfs @ 12.59 hrs, Volume= 0.198 af
Outflow = 0.91 cfs @ 12.59 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min
Primary = 0.91 cfs @ 12.59 hrs, Volume= 0.198 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 45.46' @ 12.59 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**12.0" Round Culvert** L= 112.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 43.85' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.91 cfs @ 12.59 hrs HW=45.46' TW=43.22' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.91 cfs @ 2.38 fps)

Pond BB 06 B: BB 06 B



Summary for Pond BB 11 B: BB 11 B

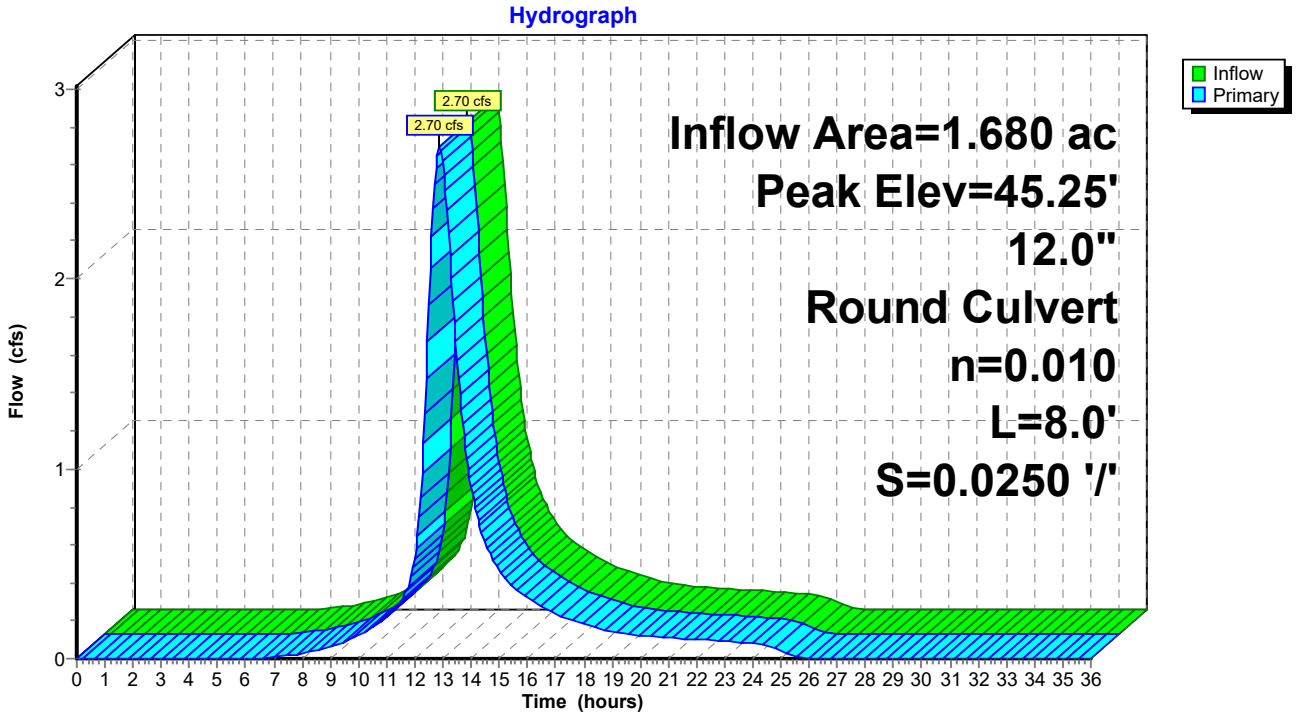
Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 3.74" for 25 yr event
Inflow = 2.70 cfs @ 12.87 hrs, Volume= 0.524 af
Outflow = 2.70 cfs @ 12.87 hrs, Volume= 0.524 af, Atten= 0%, Lag= 0.0 min
Primary = 2.70 cfs @ 12.87 hrs, Volume= 0.524 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 45.25' @ 13.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.00'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.00' / 43.80' S= 0.0250 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=2.57 cfs @ 12.87 hrs HW=45.01' TW=44.55' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.57 cfs @ 3.27 fps)

Pond BB 11 B: BB 11 B



Summary for Pond BB 11 S: BB 11 S

Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 3.74" for 25 yr event
Inflow = 2.70 cfs @ 12.87 hrs, Volume= 0.524 af
Outflow = 2.14 cfs @ 13.24 hrs, Volume= 0.524 af, Atten= 21%, Lag= 22.4 min
Primary = 2.14 cfs @ 13.24 hrs, Volume= 0.524 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 44.91' @ 13.24 hrs Surf.Area= 0 sf Storage= 2,716 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 10.0 min (871.0 - 861.0)

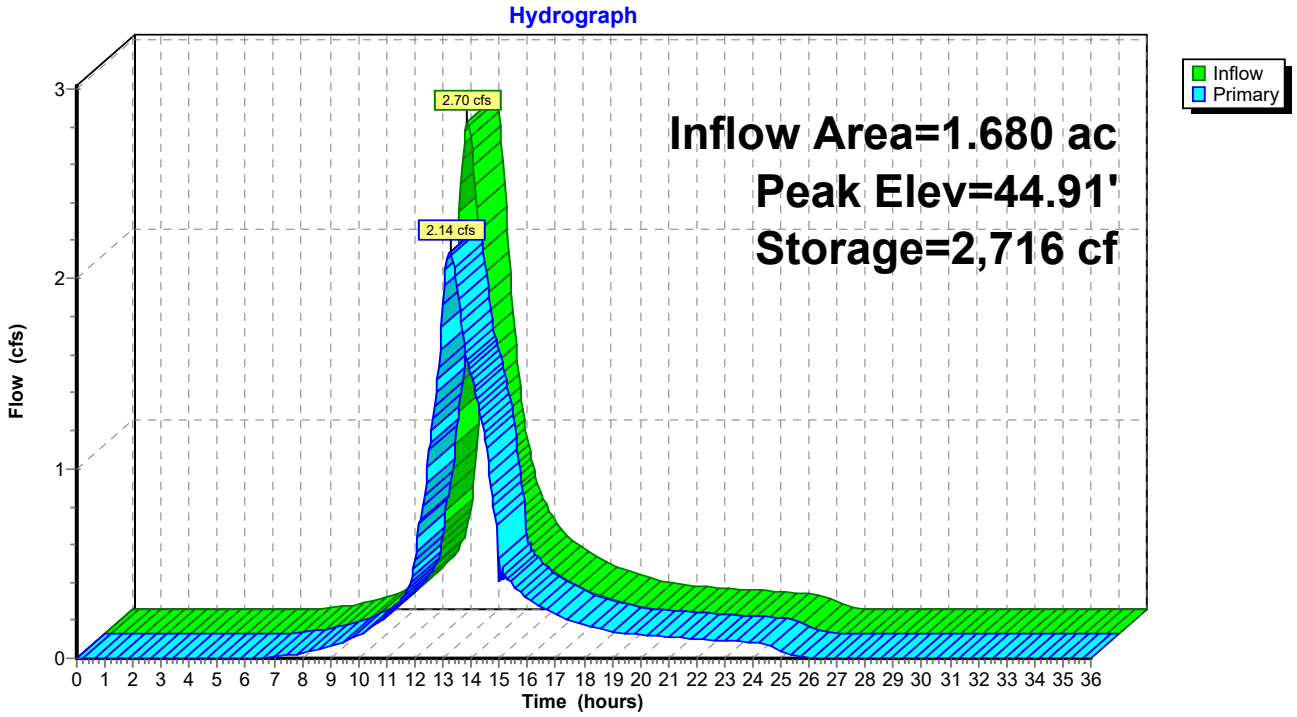
Volume	Invert	Avail.Storage	Storage Description
#1	42.97'	4,778 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.97	0	0
43.30	16	16
43.80	481	497
44.30	963	1,460
44.80	1,019	2,479
45.30	1,085	3,564
45.80	603	4,167
46.30	611	4,778

Device	Routing	Invert	Outlet Devices
#1	Primary	42.97'	**4.0" Round Culvert** L= 16.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.97' / 42.81' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	39.70'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.70' / 39.60' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Primary	44.50'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.50' / 44.40' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=2.14 cfs @ 13.24 hrs HW=44.91' TW=43.32' (Dynamic Tailwater)
- **1=Culvert** (Outlet Controls 0.53 cfs @ 6.06 fps)
- **2=Culvert** (Inlet Controls 1.19 cfs @ 6.07 fps)
- **3=Culvert** (Barrel Controls 0.42 cfs @ 2.71 fps)

Pond BB 11 S: BB 11 S



Summary for Pond PR-4: PR-4

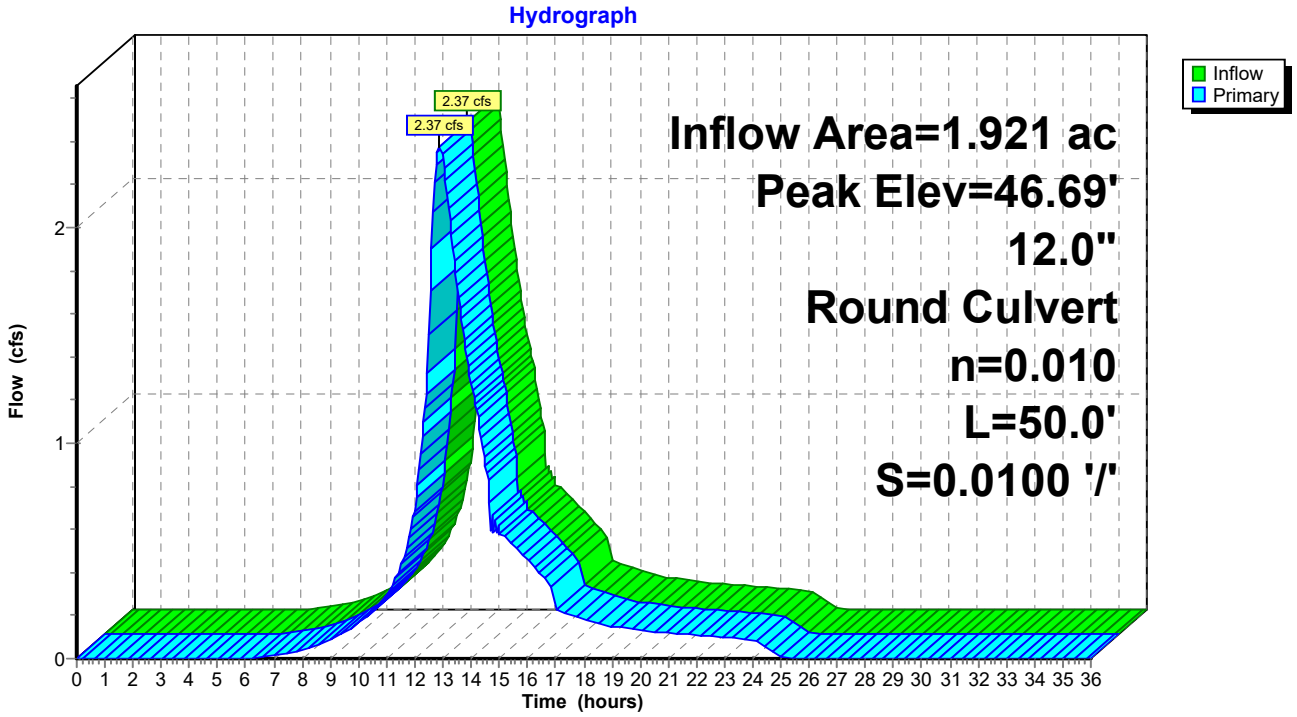
Inflow Area = 1.921 ac, 1.30% Impervious, Inflow Depth = 3.64" for 25 yr event
Inflow = 2.37 cfs @ 12.88 hrs, Volume= 0.582 af
Outflow = 2.37 cfs @ 12.88 hrs, Volume= 0.582 af, Atten= 0%, Lag= 0.0 min
Primary = 2.37 cfs @ 12.88 hrs, Volume= 0.582 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.69' @ 12.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.80'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.80' / 45.30' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=2.37 cfs @ 12.88 hrs HW=46.69' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.37 cfs @ 3.21 fps)

Pond PR-4: PR-4



Summary for Pond PR-5: PR-5

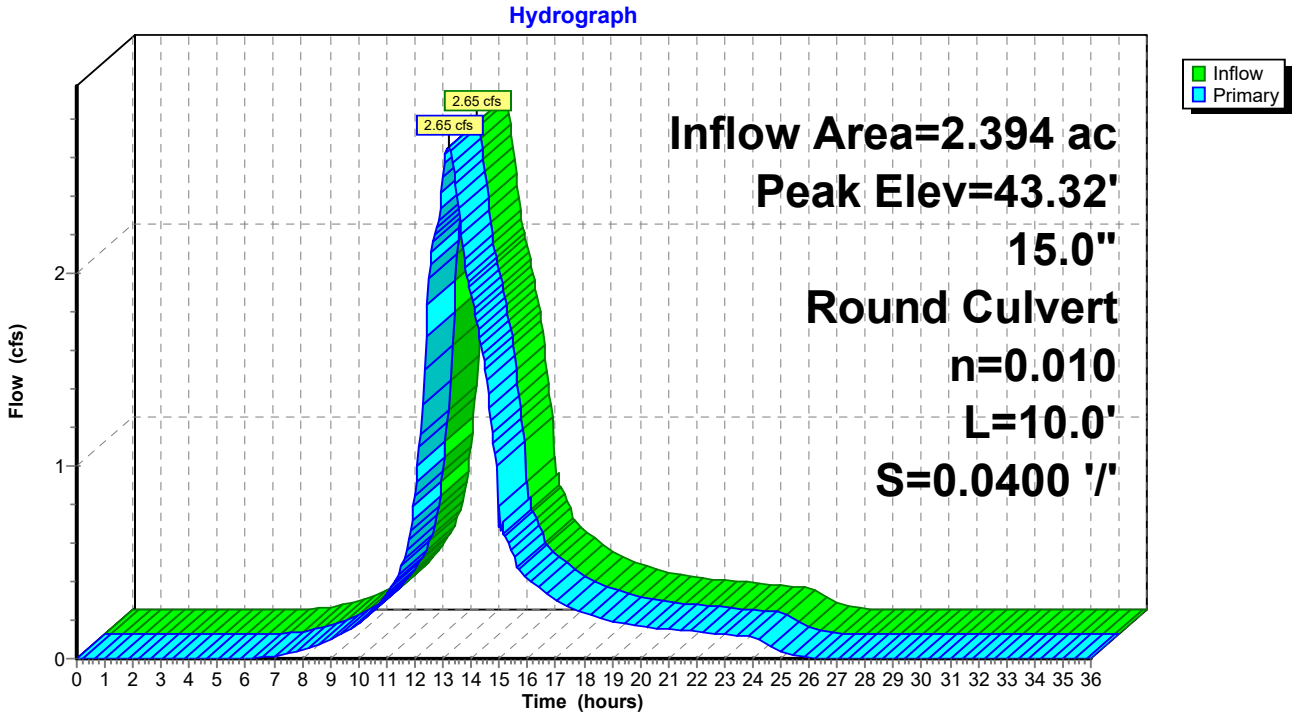
Inflow Area = 2.394 ac, 0.58% Impervious, Inflow Depth = 3.61" for 25 yr event
Inflow = 2.65 cfs @ 13.19 hrs, Volume= 0.721 af
Outflow = 2.65 cfs @ 13.19 hrs, Volume= 0.721 af, Atten= 0%, Lag= 0.0 min
Primary = 2.65 cfs @ 13.19 hrs, Volume= 0.721 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.32' @ 13.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.50'	**15.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.10' S= 0.0400 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=2.65 cfs @ 13.19 hrs HW=43.32' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.65 cfs @ 3.09 fps)

Pond PR-5: PR-5



Summary for Pond SB 01 B: SB 01 B

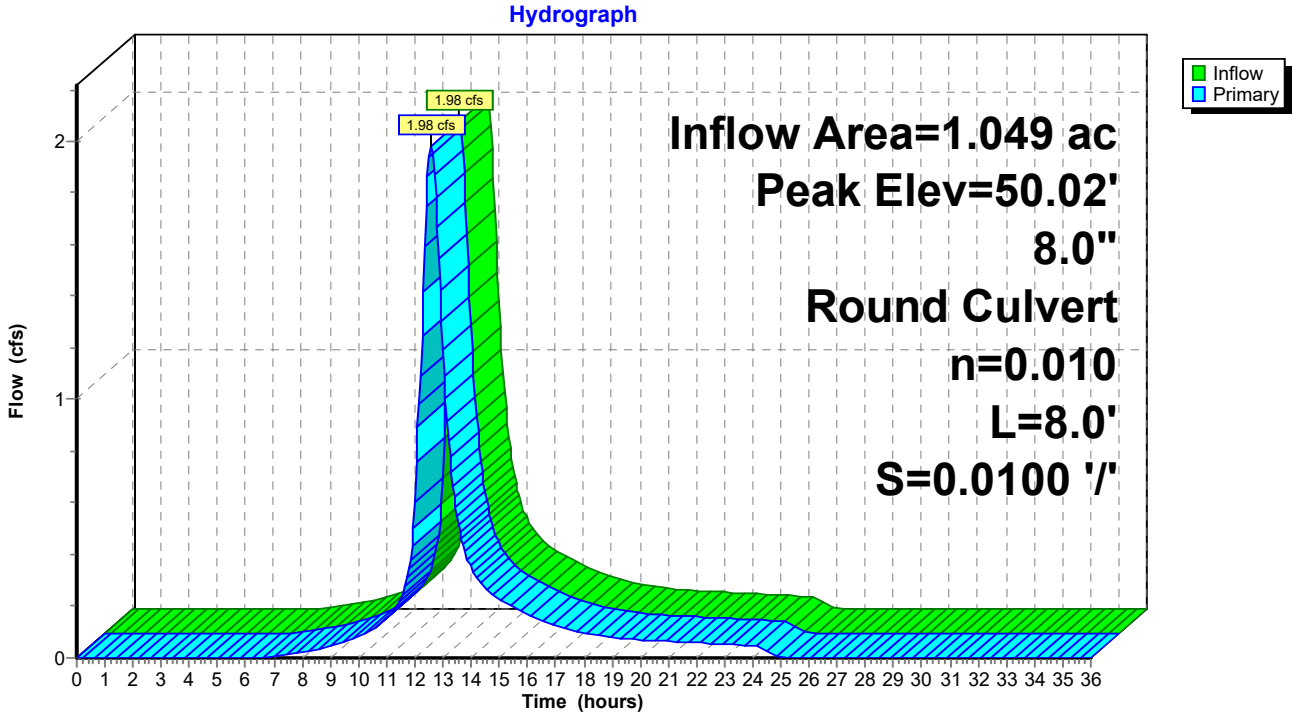
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 3.55" for 25 yr event
Inflow = 1.98 cfs @ 12.57 hrs, Volume= 0.311 af
Outflow = 1.98 cfs @ 12.57 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.57 hrs, Volume= 0.311 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 50.02' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.97 cfs @ 12.57 hrs HW=50.01' TW=47.87' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 1.97 cfs @ 5.65 fps)

Pond SB 01 B: SB 01 B



Summary for Pond SB 01 S: SB 01 S

Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 3.55" for 25 yr event
Inflow = 1.98 cfs @ 12.57 hrs, Volume= 0.311 af
Outflow = 1.15 cfs @ 13.02 hrs, Volume= 0.311 af, Atten= 42%, Lag= 27.2 min
Primary = 1.15 cfs @ 13.02 hrs, Volume= 0.311 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.37' @ 13.02 hrs Surf.Area= 0 sf Storage= 2,253 cf

Plug-Flow detention time= 13.8 min calculated for 0.310 af (100% of inflow)
Center-of-Mass det. time= 13.8 min (853.9 - 840.1)

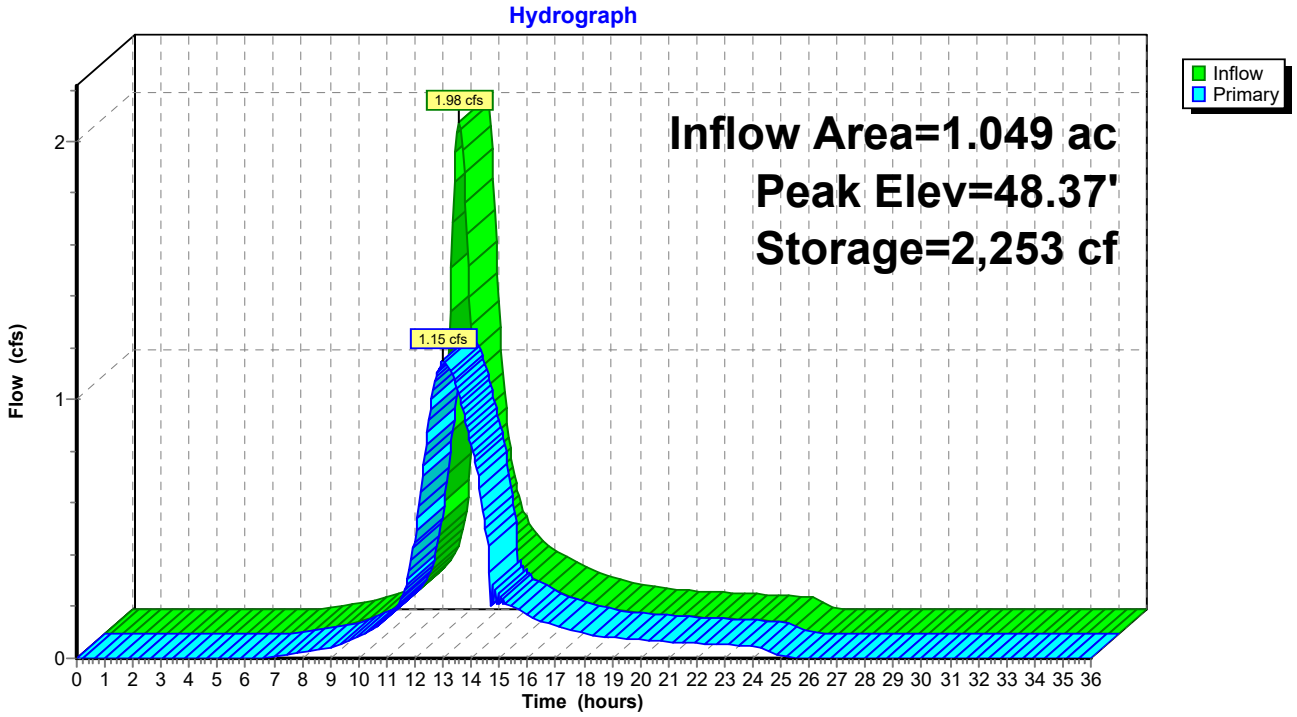
Volume	Invert	Avail.Storage	Storage Description
#1	46.30'	4,121 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.30	0	0
46.80	16	16
47.30	386	402
47.80	837	1,239
48.30	886	2,125
48.80	943	3,068
49.30	523	3,591
49.80	530	4,121

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.20' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#2	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.15 cfs @ 13.02 hrs HW=48.37' TW=46.91' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.14 cfs @ 5.80 fps)
2=Culvert (Barrel Controls 0.02 cfs @ 1.28 fps)

Pond SB 01 S: SB 01 S



Summary for Pond SB 03 B: SB 03B

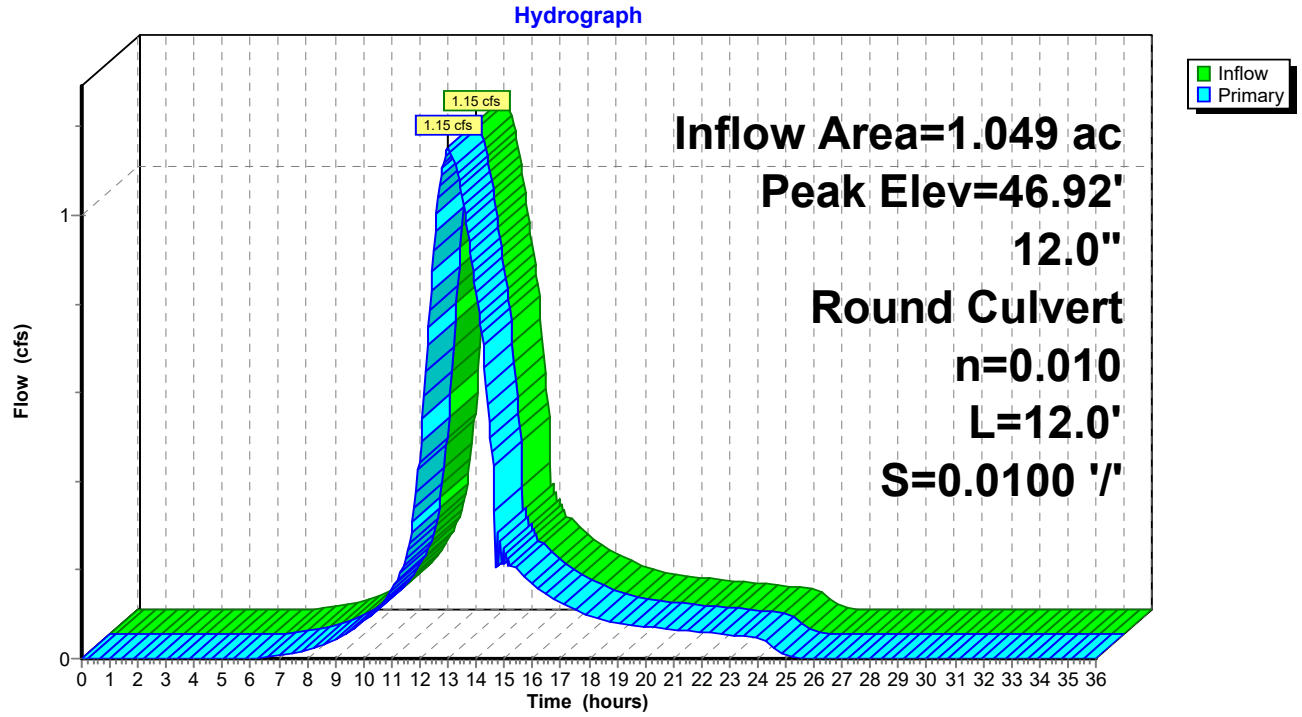
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 3.55" for 25 yr event
Inflow = 1.15 cfs @ 13.02 hrs, Volume= 0.311 af
Outflow = 1.15 cfs @ 13.02 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 13.02 hrs, Volume= 0.311 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.92' @ 12.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.25'	**12.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.25' / 46.13' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.18 cfs @ 13.02 hrs HW=46.91' TW=46.67' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.18 cfs @ 3.02 fps)

Pond SB 03 B: SB 03B



Summary for Pond SB 11 B: SB 11 B

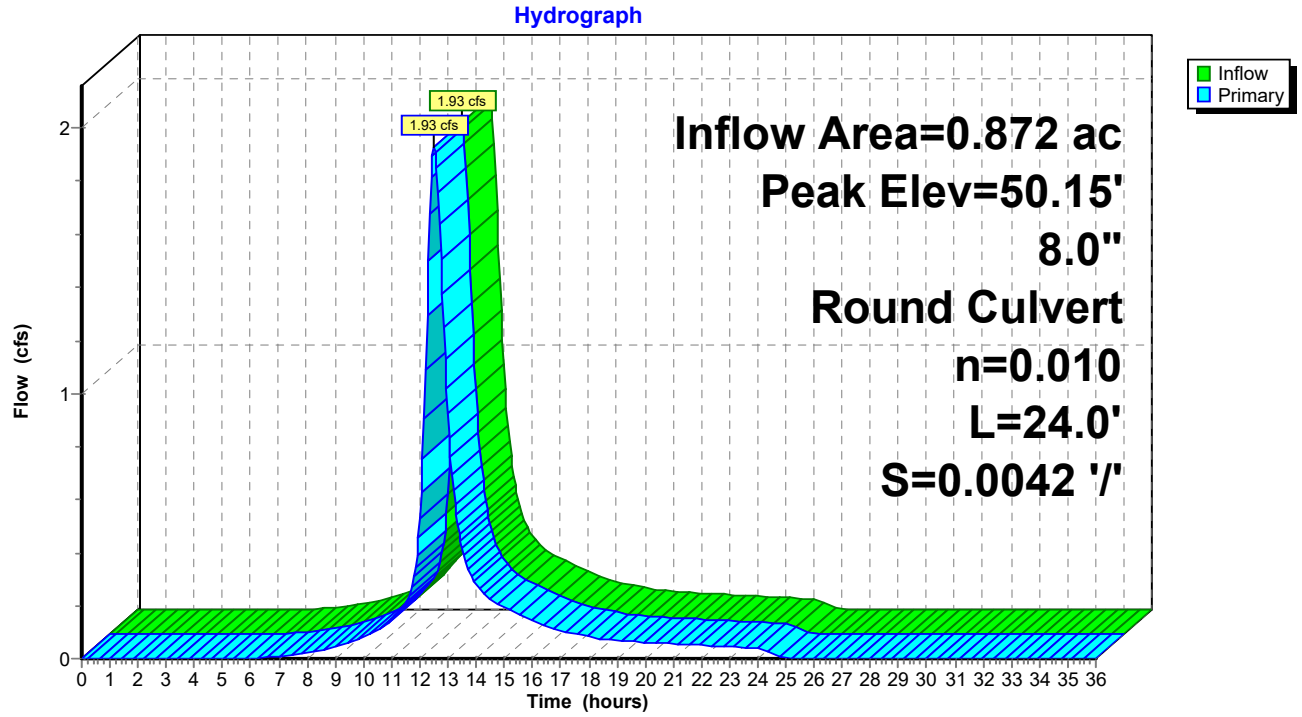
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 3.74" for 25 yr event
Inflow = 1.93 cfs @ 12.51 hrs, Volume= 0.272 af
Outflow = 1.93 cfs @ 12.51 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min
Primary = 1.93 cfs @ 12.51 hrs, Volume= 0.272 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 50.15' @ 12.51 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.50'	**8.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.50' / 48.40' S= 0.0042 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.93 cfs @ 12.51 hrs HW=50.15' TW=48.32' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.93 cfs @ 5.52 fps)

Pond SB 11 B: SB 11 B



Summary for Pond SB 11 S: SB 11 S

Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 3.74" for 25 yr event
Inflow = 1.93 cfs @ 12.51 hrs, Volume= 0.272 af
Outflow = 1.25 cfs @ 12.85 hrs, Volume= 0.272 af, Atten= 35%, Lag= 20.5 min
Primary = 1.25 cfs @ 12.85 hrs, Volume= 0.272 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.70' @ 12.85 hrs Surf.Area= 0 sf Storage= 2,656 cf

Plug-Flow detention time= 30.8 min calculated for 0.271 af (100% of inflow)
Center-of-Mass det. time= 30.8 min (864.5 - 833.7)

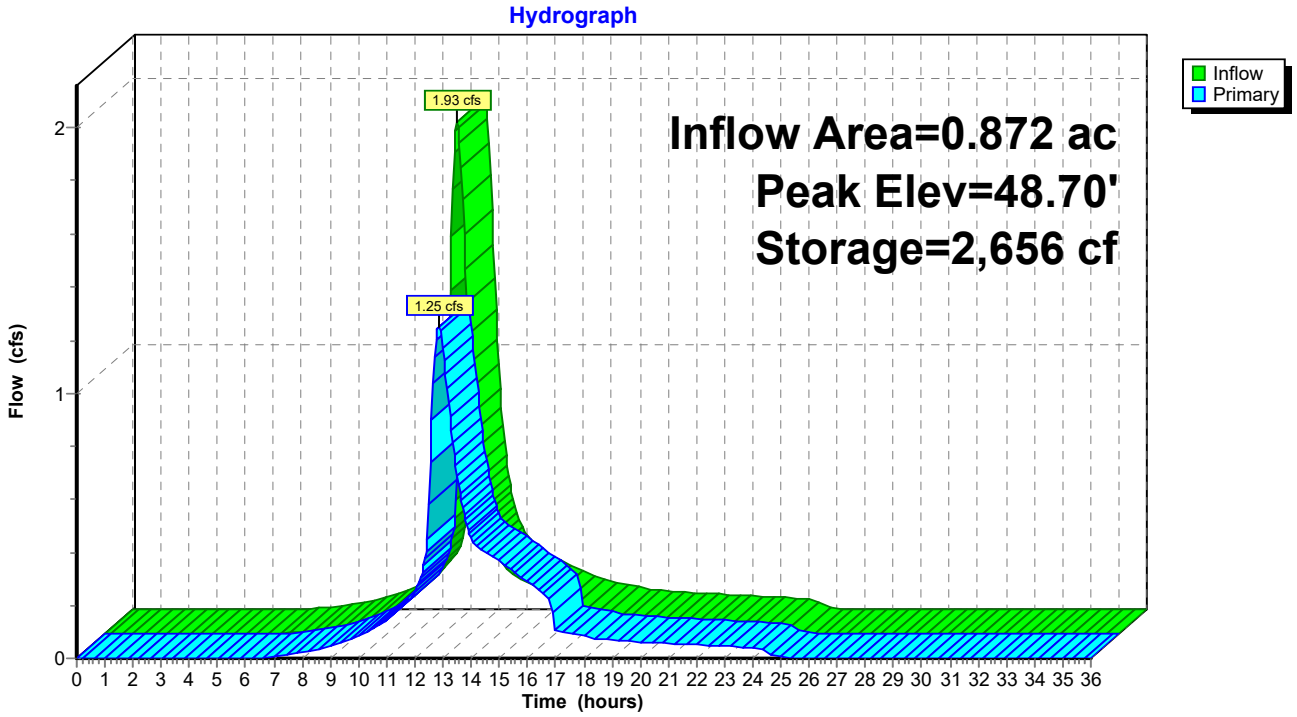
Volume	Invert	Avail.Storage	Storage Description
#1	46.80'	3,953 cf	**Custom Stage Data** Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.80	0	0
47.30	16	16
47.80	888	904
48.30	944	1,848
48.80	1,001	2,849
49.30	544	3,393
49.80	560	3,953

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**4.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.72' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	48.10'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.10' / 48.00' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.25 cfs @ 12.85 hrs HW=48.70' TW=47.45' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.47 cfs @ 5.39 fps)
2=Culvert (Barrel Controls 0.78 cfs @ 3.08 fps)

Pond SB 11 S: SB 11 S



Summary for Pond SB 12 B: SB 12 B

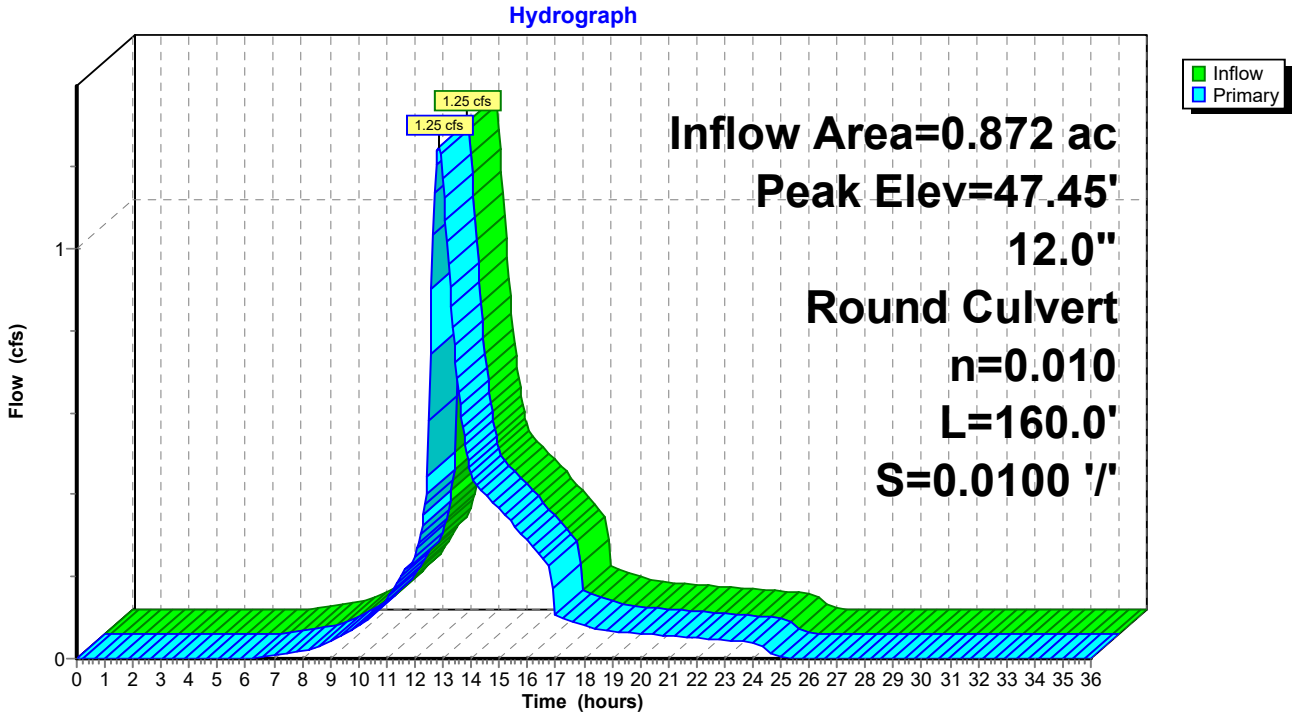
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 3.74" for 25 yr event
Inflow = 1.25 cfs @ 12.85 hrs, Volume= 0.272 af
Outflow = 1.25 cfs @ 12.85 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.85 hrs, Volume= 0.272 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.45' @ 12.86 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 45.20' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.24 cfs @ 12.85 hrs HW=47.45' TW=46.69' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.24 cfs @ 3.28 fps)

Pond SB 12 B: SB 12 B

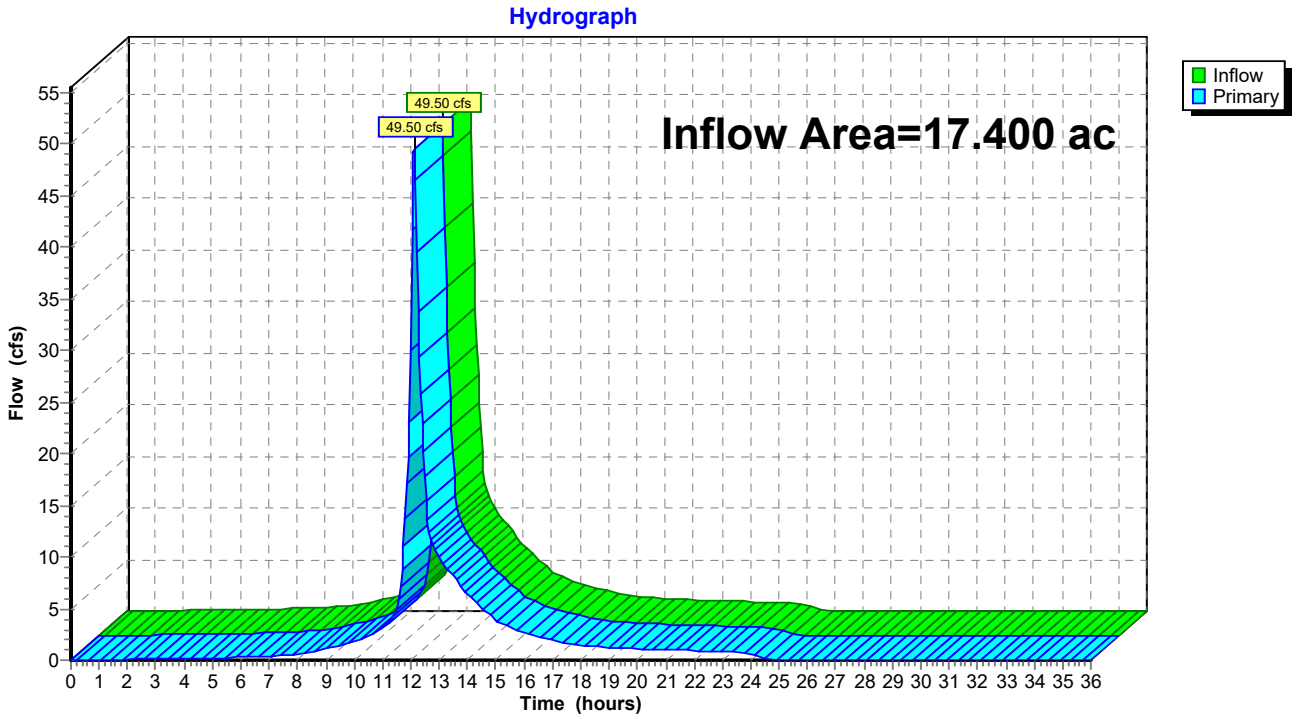


Summary for Link POA: POA

Inflow Area = 17.400 ac, 49.60% Impervious, Inflow Depth > 3.67" for 25 yr event
Inflow = 49.50 cfs @ 12.11 hrs, Volume= 5.318 af
Primary = 49.50 cfs @ 12.11 hrs, Volume= 5.318 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POA: POA



Summary for Subcatchment PR-1: PR-1

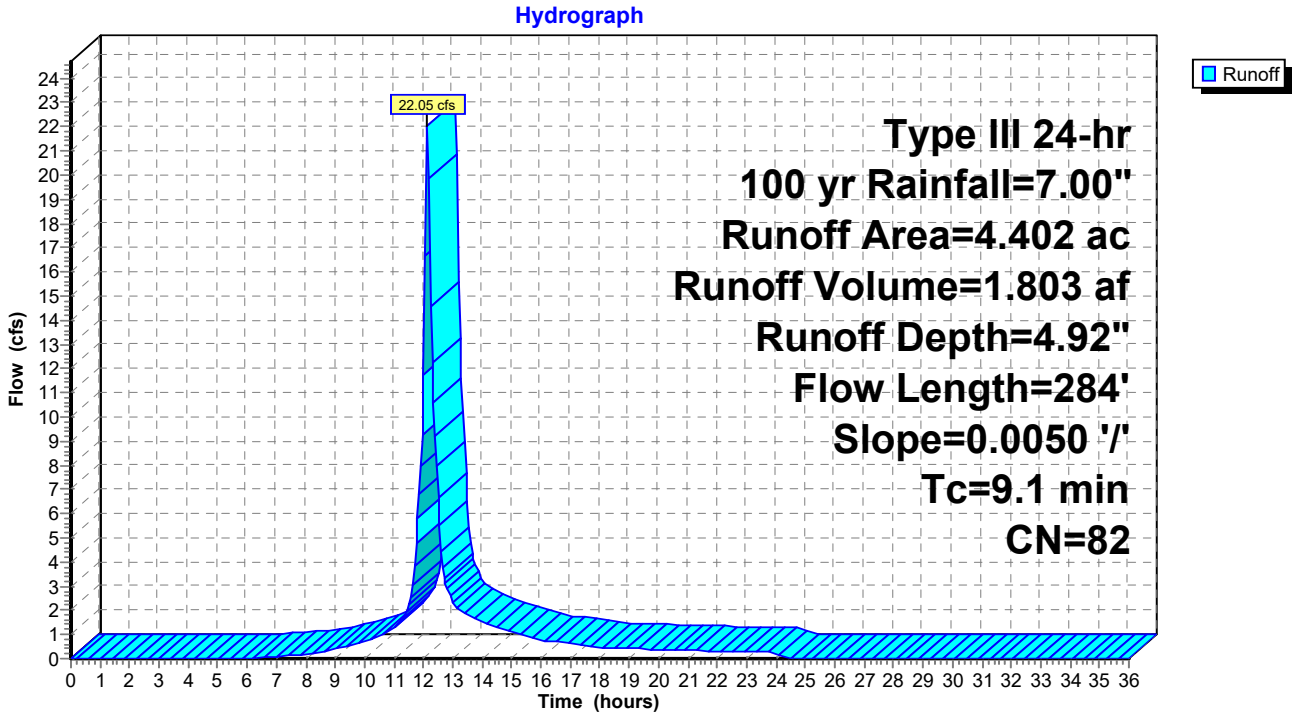
Runoff = 22.05 cfs @ 12.13 hrs, Volume= 1.803 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
1.892	61	>75% Grass cover, Good, HSG B
2.510	98	Paved parking, HSG B
4.402	82	Weighted Average
1.892		42.98% Pervious Area
2.510		57.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	50	0.0050	0.69		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
7.9	234	0.0050	0.49		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
9.1	284	Total			

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-1A: PR-1A

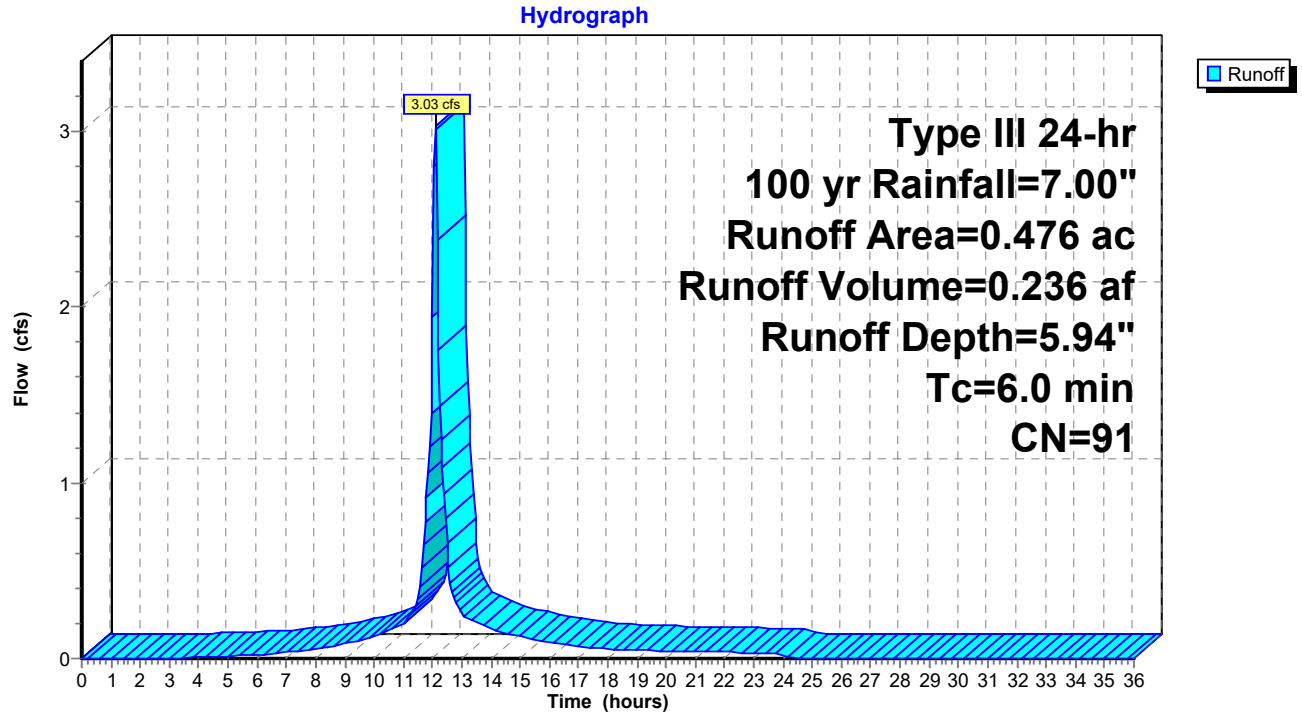
Runoff = 3.03 cfs @ 12.09 hrs, Volume= 0.236 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.090	61	>75% Grass cover, Good, HSG B
0.386	98	Paved parking, HSG B
0.476	91	Weighted Average
0.090		18.91% Pervious Area
0.386		81.09% Impervious Area

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

Subcatchment PR-1A: PR-1A



Summary for Subcatchment PR-1B: PR-1B

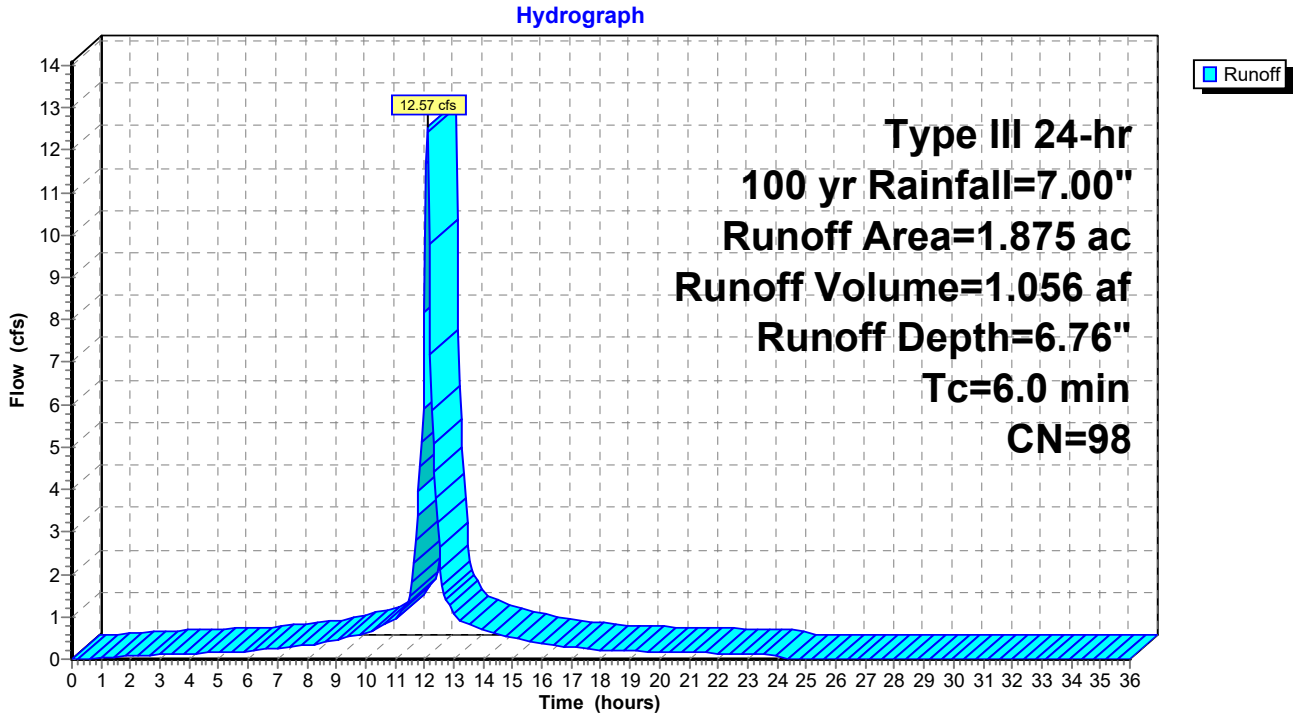
Runoff = 12.57 cfs @ 12.09 hrs, Volume= 1.056 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
1.875	98	Roofs, HSG B
1.875		100.00% Impervious Area

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

Subcatchment PR-1B: PR-1B



Summary for Subcatchment PR-1C: PR-1C

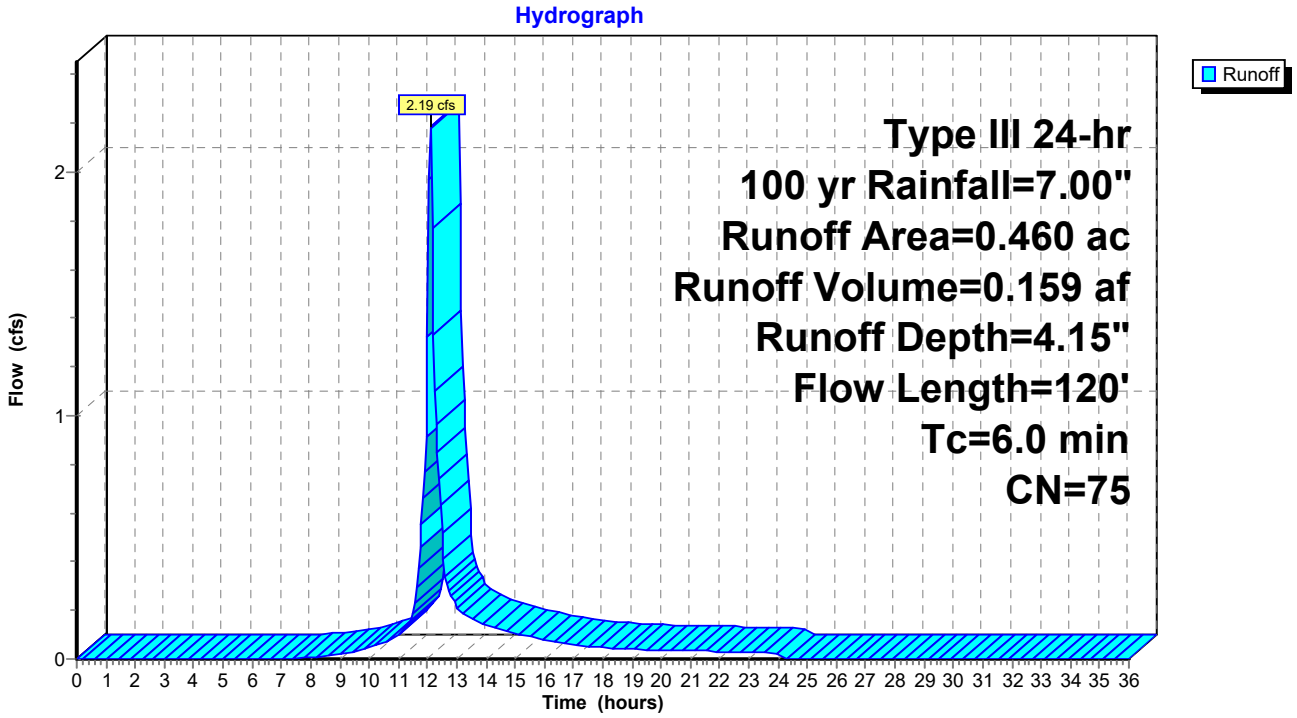
Runoff = 2.19 cfs @ 12.09 hrs, Volume= 0.159 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.020	55	Woods, Good, HSG B
0.260	61	>75% Grass cover, Good, HSG B
0.180	98	Paved parking, HSG B
0.460	75	Weighted Average
0.280		60.87% Pervious Area
0.180		39.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		**Sheet Flow, 20' SF** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	40	0.5000	0.35		**Sheet Flow, 30' SF** Grass: Dense n= 0.240 P2= 3.20"
0.1	12	0.0100	1.61		**Shallow Concentrated Flow, 12' SCF** Unpaved Kv= 16.1 fps
0.2	48	0.0400	4.06		**Shallow Concentrated Flow, 48' SCF** Paved Kv= 20.3 fps
5.8	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-1C: PR-1C



Summary for Subcatchment PR-1D: PR-1D

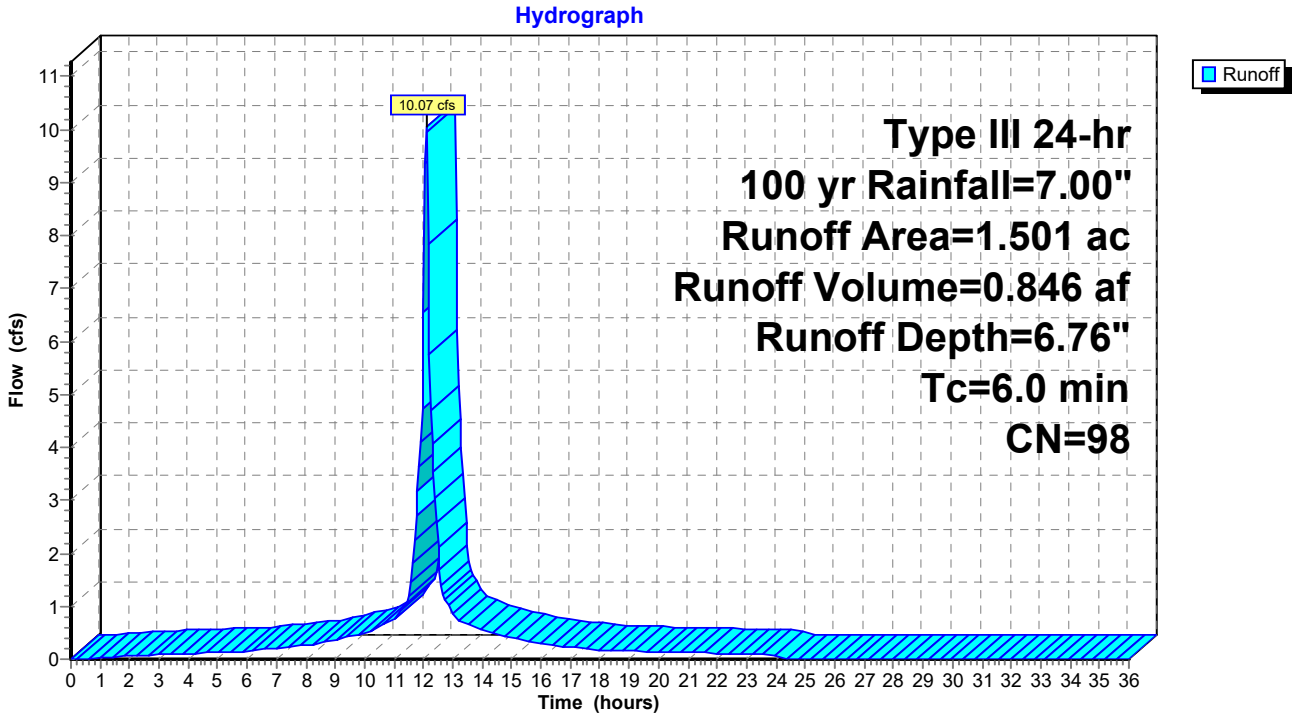
Runoff = 10.07 cfs @ 12.09 hrs, Volume= 0.846 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
1.501	98	Roofs, HSG B
1.501		100.00% Impervious Area

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

Subcatchment PR-1D: PR-1D



Summary for Subcatchment PR-1E: PR-1E

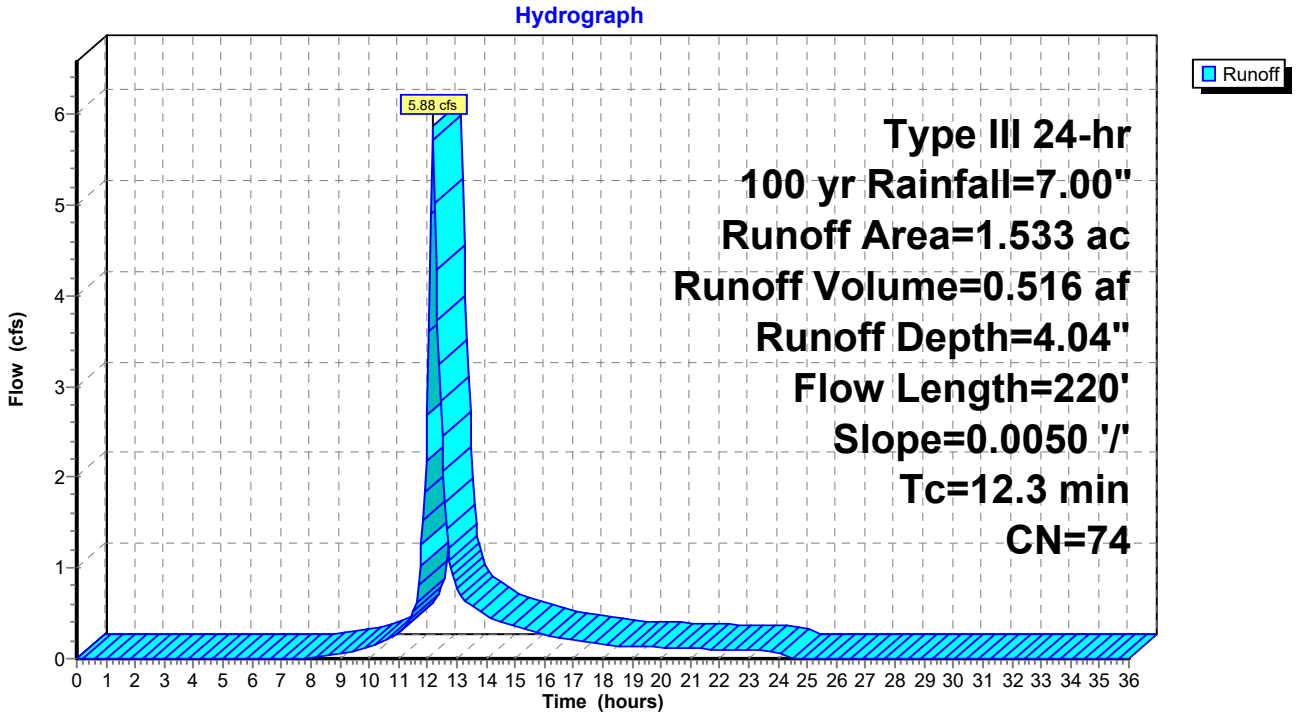
Runoff = 5.88 cfs @ 12.17 hrs, Volume= 0.516 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.533	98	Paved parking, HSG B
1.533	74	Weighted Average
1.000		65.23% Pervious Area
0.533		34.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' SF** Grass: Short n= 0.150 P2= 3.20"
2.5	170	0.0050	1.14		**Shallow Concentrated Flow, 170' SCF** Unpaved Kv= 16.1 fps
12.3	220	Total			

Subcatchment PR-1E: PR-1E



Summary for Subcatchment PR-2: PR-2

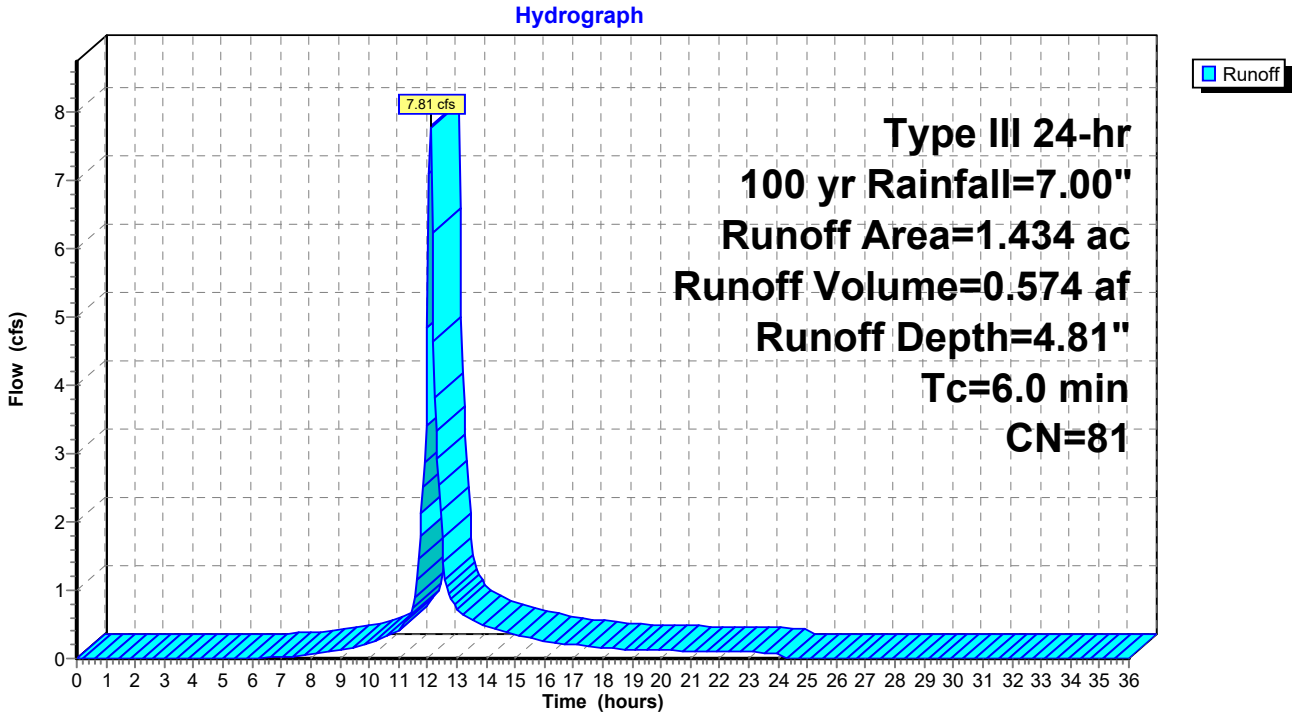
Runoff = 7.81 cfs @ 12.09 hrs, Volume= 0.574 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.672	61	>75% Grass cover, Good, HSG B
0.762	98	Paved parking, HSG B
1.434	81	Weighted Average
0.672		46.86% Pervious Area
0.762		53.14% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-2A: PR-2B

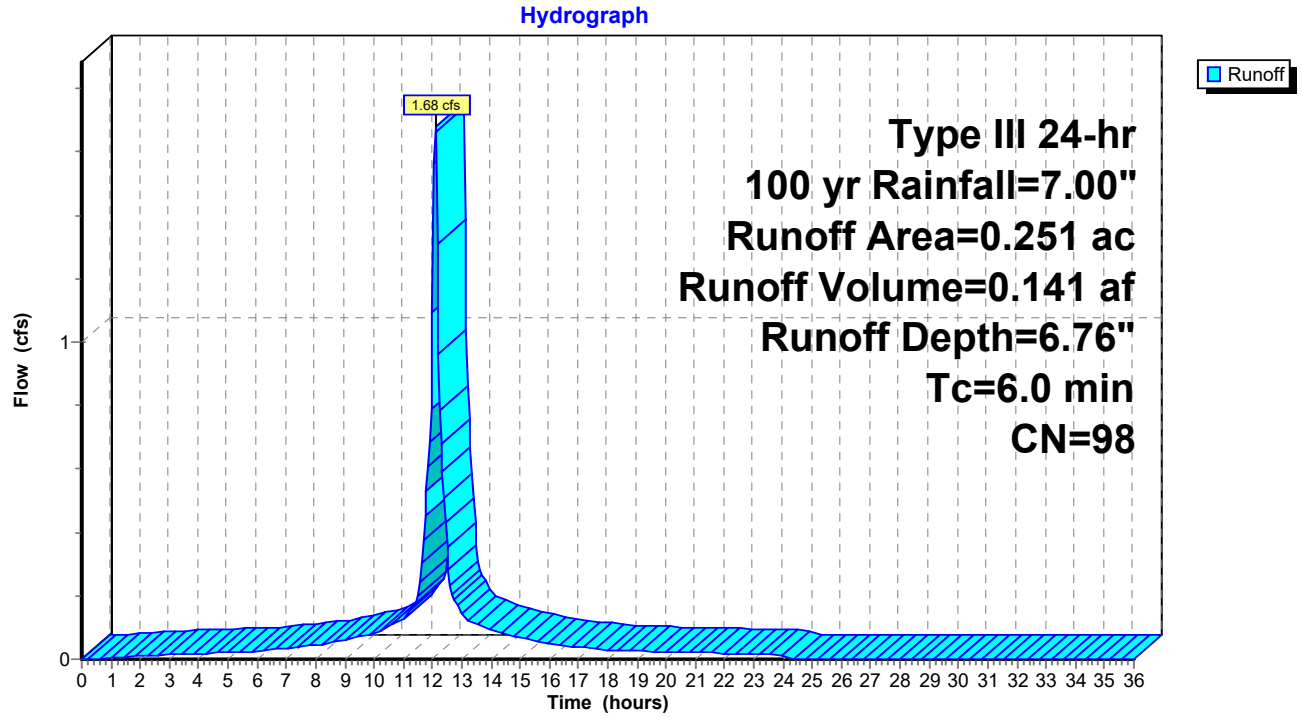
Runoff = 1.68 cfs @ 12.09 hrs, Volume= 0.141 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.251	98	Roofs, HSG B
0.251		100.00% Impervious Area

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

Subcatchment PR-2A: PR-2B



Summary for Subcatchment PR-3A: PR-3A

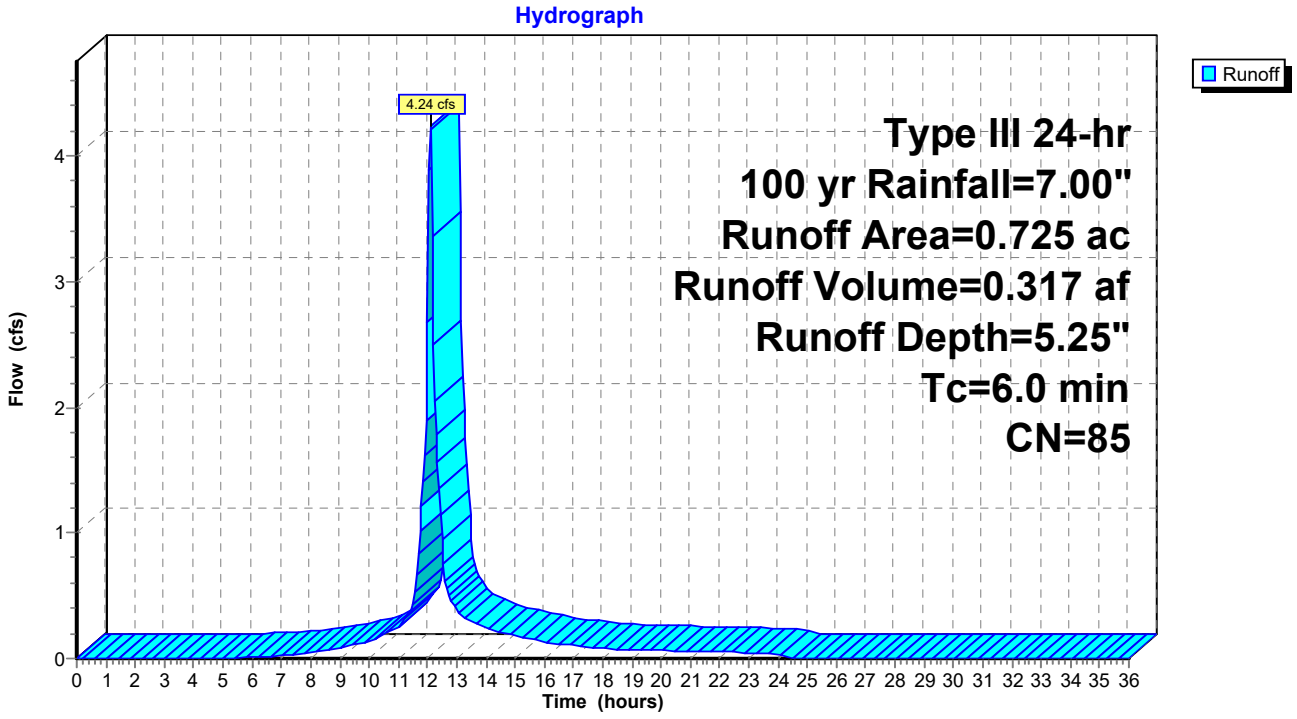
Runoff = 4.24 cfs @ 12.09 hrs, Volume= 0.317 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.249	61	>75% Grass cover, Good, HSG B
0.476	98	Paved parking, HSG B
0.725	85	Weighted Average
0.249		34.34% Pervious Area
0.476		65.66% Impervious Area

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

Subcatchment PR-3A: PR-3A



Summary for Subcatchment PR-3B: PR-3B

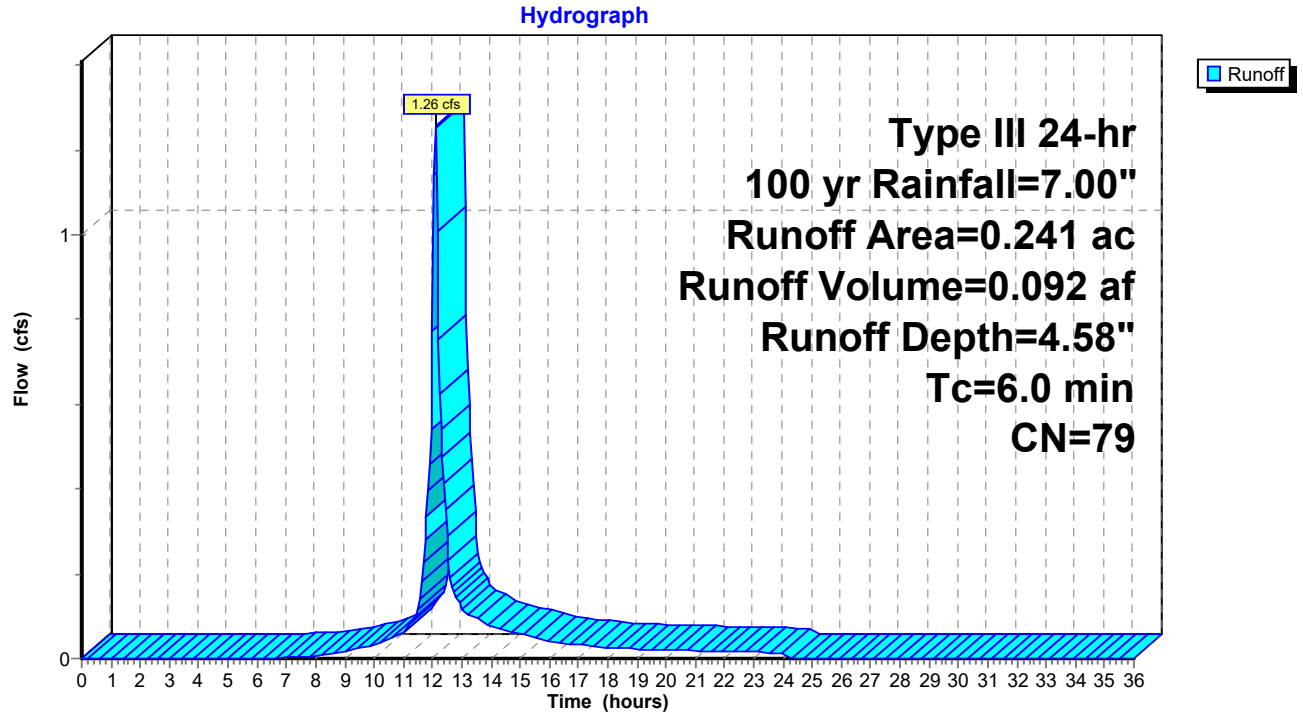
Runoff = 1.26 cfs @ 12.09 hrs, Volume= 0.092 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.124	61	>75% Grass cover, Good, HSG B
0.117	98	Paved parking, HSG B
0.241	79	Weighted Average
0.124		51.45% Pervious Area
0.117		48.55% Impervious Area

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

Subcatchment PR-3B: PR-3B



Summary for Subcatchment PR-3C: PR-3C

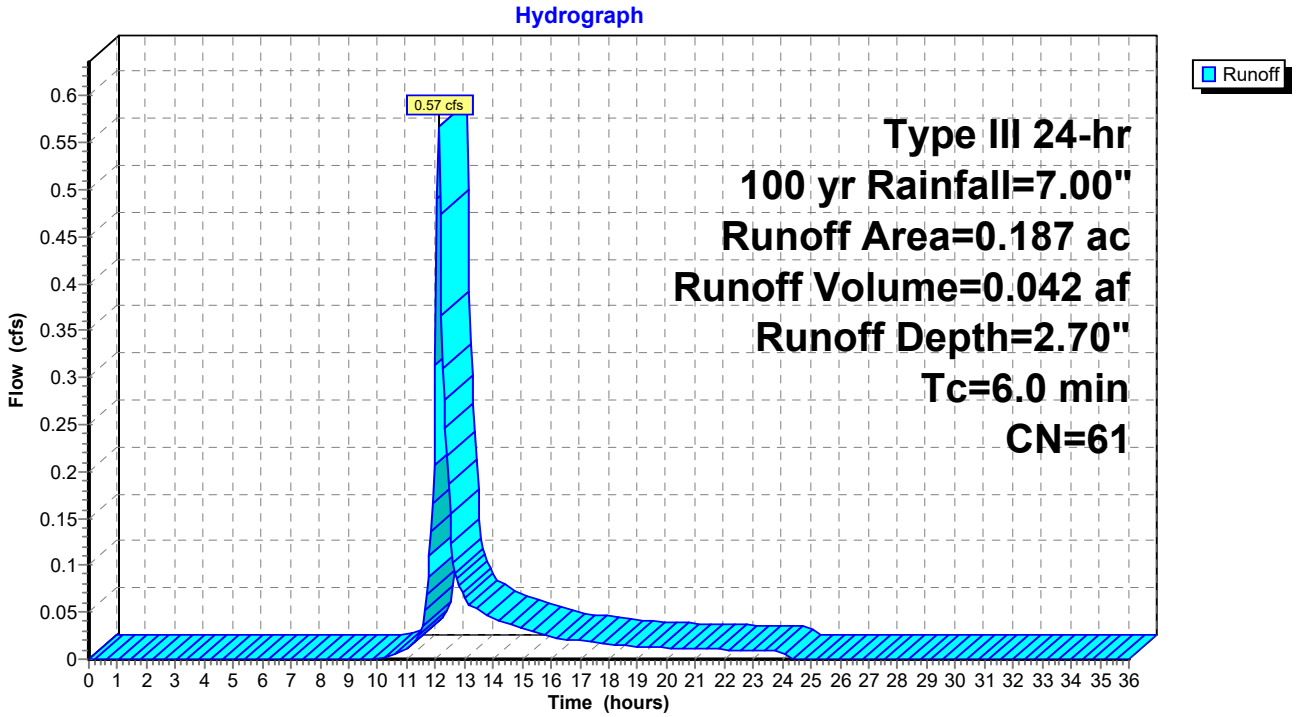
Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.042 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.187	61	>75% Grass cover, Good, HSG B
0.187		100.00% Pervious Area

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

Subcatchment PR-3C: PR-3C



Summary for Subcatchment PR-4A: PR-5A

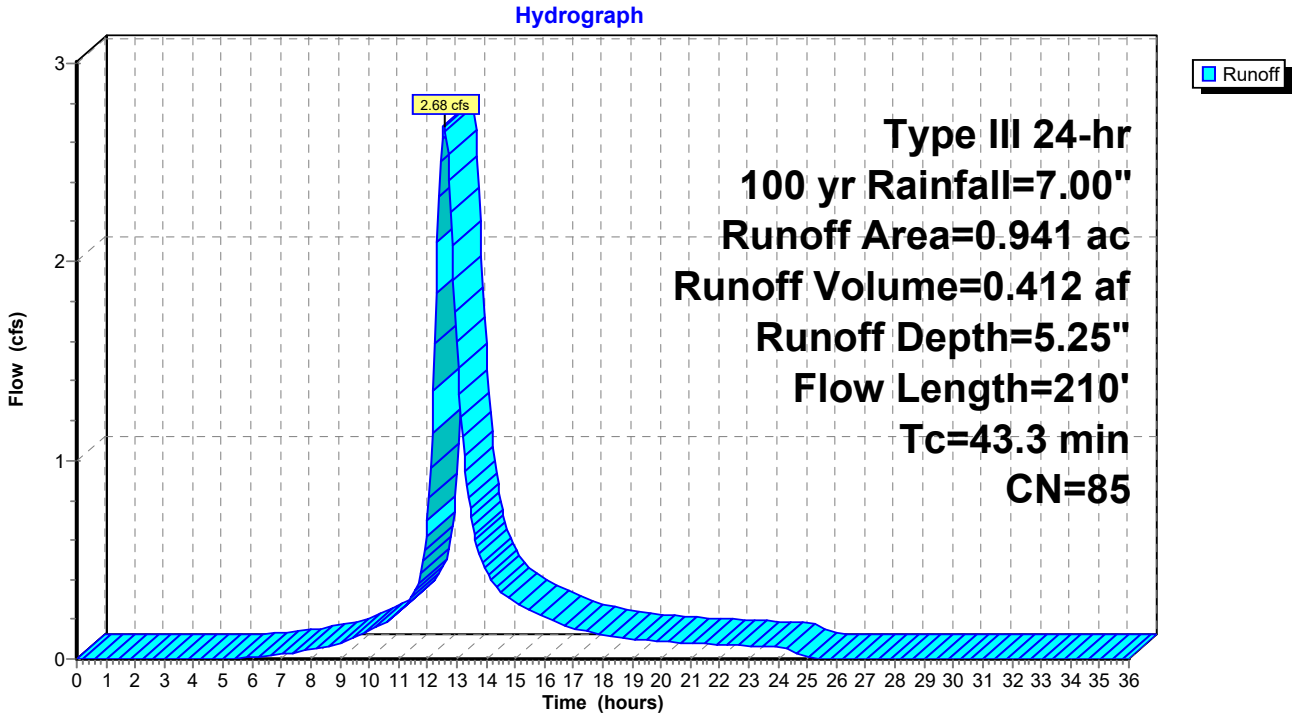
Runoff = 2.68 cfs @ 12.57 hrs, Volume= 0.412 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (ac)	CN	Description
*	0.941	85	SYNTHETIC TURF- PAD- LINER
	0.941		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	110	0.0055	0.05		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
43.3	210	Total			

Subcatchment PR-4A: PR-5A



Summary for Subcatchment PR-4B: SB 11 A

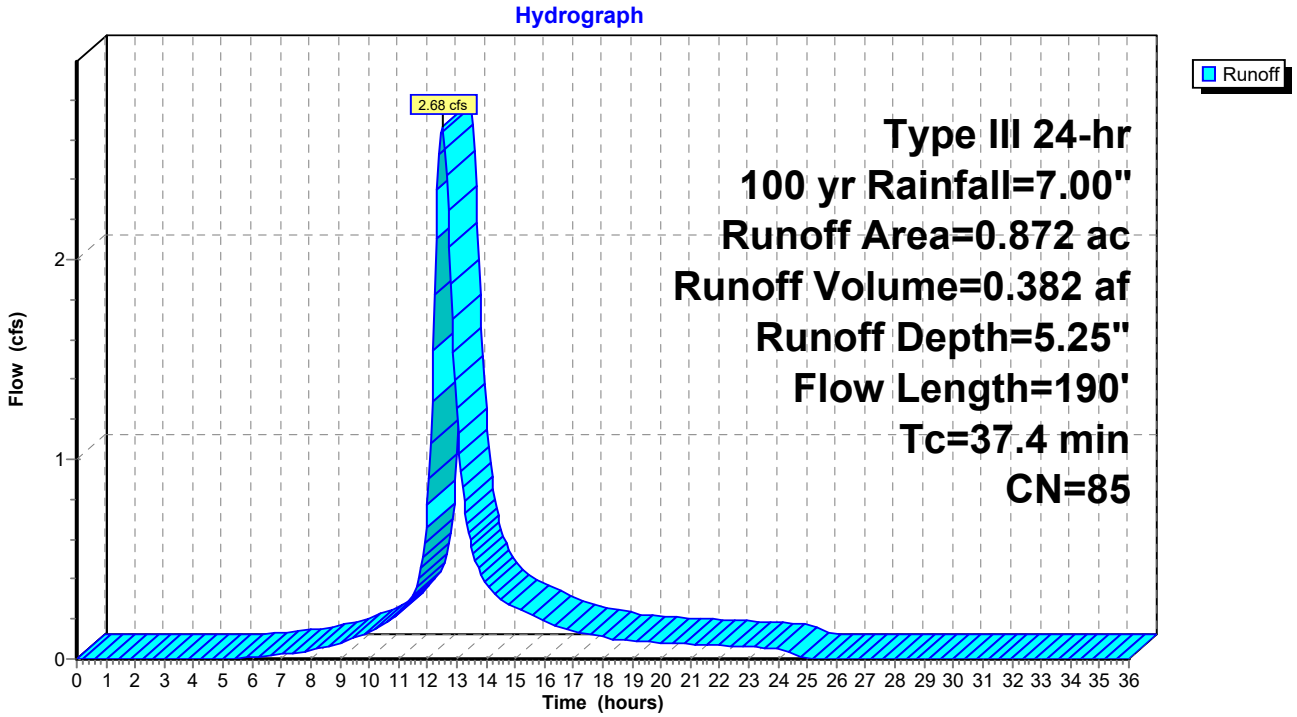
Runoff = 2.68 cfs @ 12.50 hrs, Volume= 0.382 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (ac)	CN	Description
*	0.872	85	SYNTHETIC TURF- PAD- LINER
	0.872		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	90	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
3.7	100	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
37.4	190	Total			

Subcatchment PR-4B: SB 11 A



Summary for Subcatchment PR-4C: SB 00 DPW SLOPE

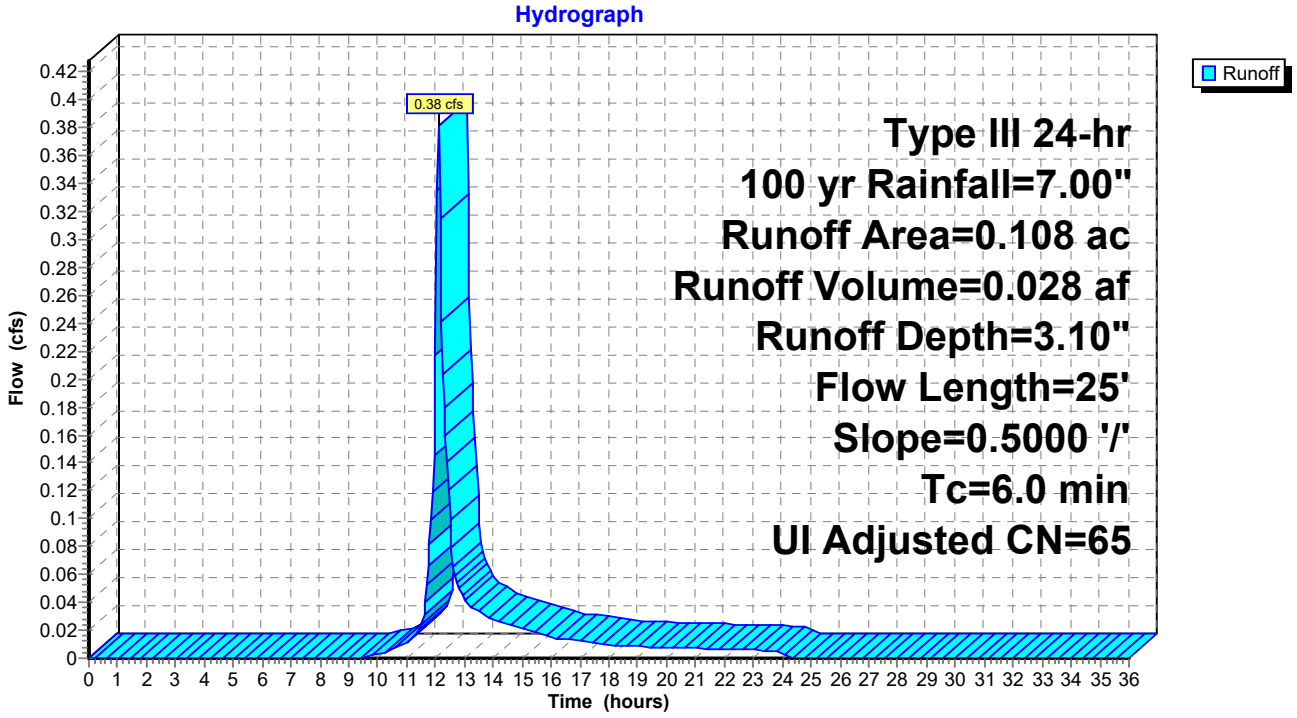
Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Adj	Description
0.025	98		Unconnected pavement, HSG B
0.083	61		>75% Grass cover, Good, HSG B
0.108	70	65	Weighted Average, UI Adjusted
0.083			76.85% Pervious Area
0.025			23.15% Impervious Area
0.025			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	25	0.5000	0.32		**Sheet Flow, SLOPING LAND** Grass: Dense n= 0.240 P2= 3.20"
1.3	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PR-4C: SB 00 DPW SLOPE



Summary for Subcatchment PR-5A: BB 01 A

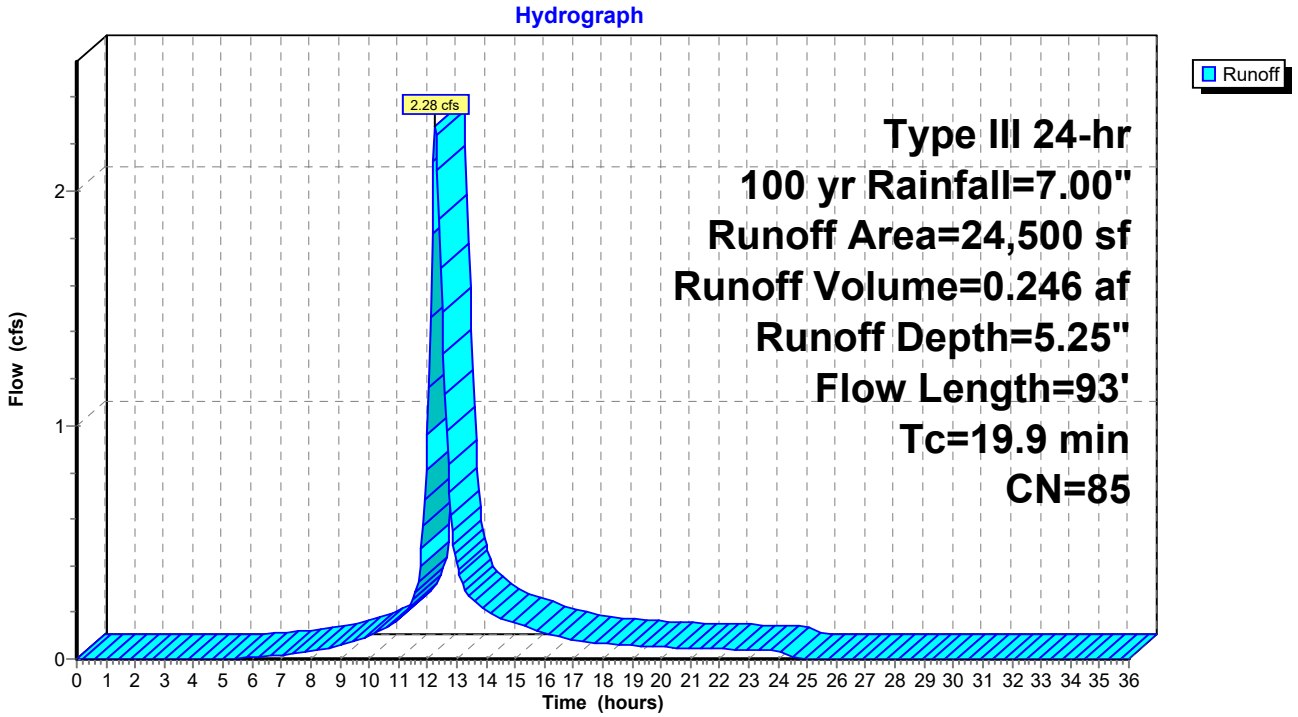
Runoff = 2.28 cfs @ 12.27 hrs, Volume= 0.246 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	24,500	85	SYNTHETIC TURF- PAD- LINER
	24,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	46	0.0067	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
19.9	93	Total			

Subcatchment PR-5A: BB 01 A



Summary for Subcatchment PR-5B: BB 11 A

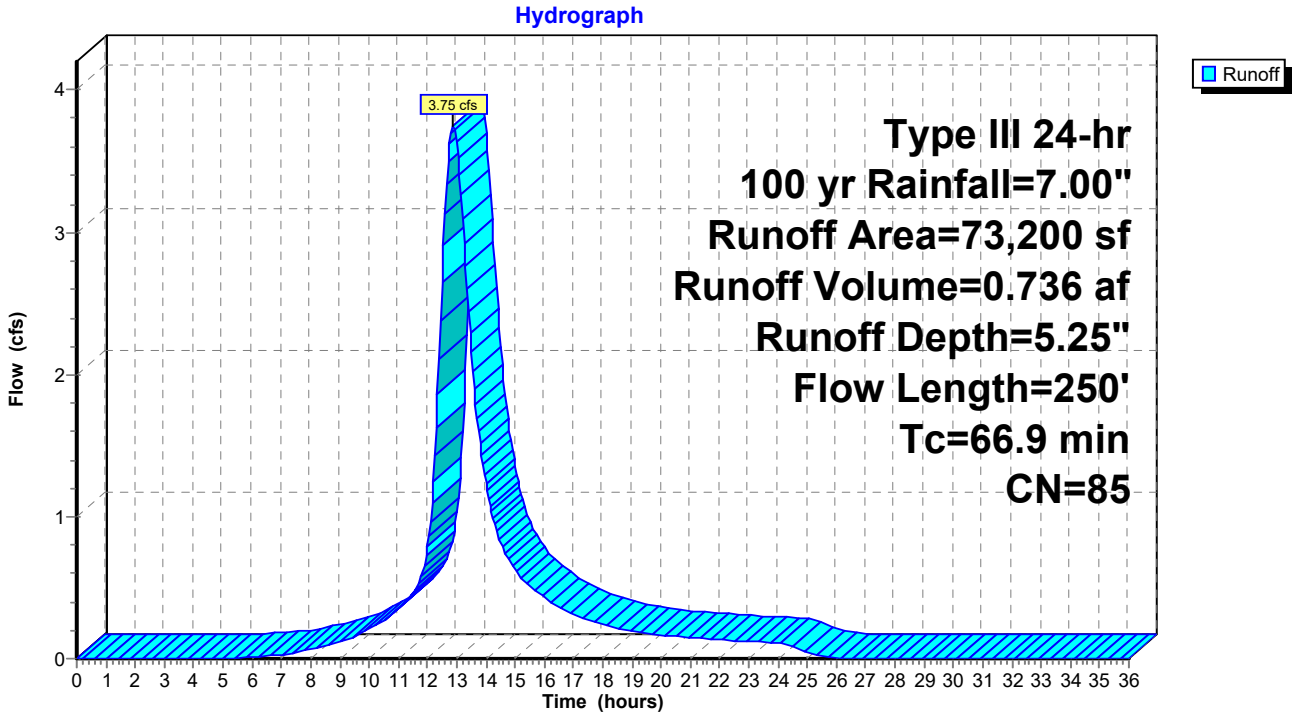
Runoff = 3.75 cfs @ 12.87 hrs, Volume= 0.736 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	73,200	85	SYNTHETIC TURF- PAD- LINER
	73,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	53	0.0055	0.04		**Sheet Flow, Through Turf Section** Grass: Bermuda n= 0.410 P2= 3.20"
43.1	150	0.0083	0.06		**Sheet Flow, SYNTHETIC TURF** Grass: Bermuda n= 0.410 P2= 3.20"
1.7	47	0.0001	0.45	0.16	**Pipe Channel, TRENCH DRAIN LEVEL** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
66.9	250	Total			

Subcatchment PR-5B: BB 11 A



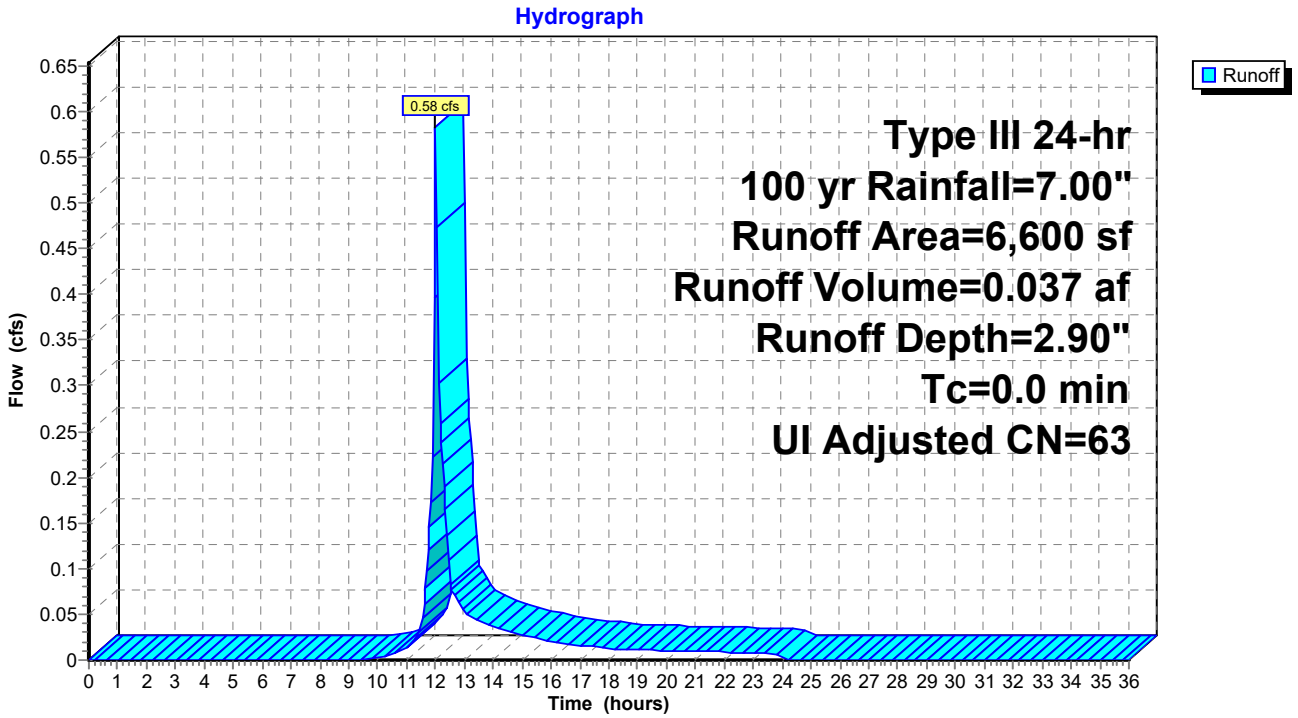
Summary for Subcatchment PR-5C: SLOPE

Runoff = 0.58 cfs @ 12.01 hrs, Volume= 0.037 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Adj	Description
600	98		Unconnected roofs, HSG B
6,000	61		>75% Grass cover, Good, HSG B
6,600	64	63	Weighted Average, UI Adjusted
6,000			90.91% Pervious Area
600			9.09% Impervious Area
600			100.00% Unconnected

Subcatchment PR-5C: SLOPE



Summary for Pond 1P: rain garden#1 cascading

Inflow Area = 0.725 ac, 65.66% Impervious, Inflow Depth = 5.25" for 100 yr event
Inflow = 4.24 cfs @ 12.09 hrs, Volume= 0.317 af
Outflow = 4.50 cfs @ 12.10 hrs, Volume= 0.315 af, Atten= 0%, Lag= 0.7 min
Primary = 2.91 cfs @ 12.10 hrs, Volume= 0.304 af
Secondary = 1.59 cfs @ 12.10 hrs, Volume= 0.011 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 62.09' @ 12.10 hrs Surf.Area= 517 sf Storage= 596 cf
Flood Elev= 63.00' Surf.Area= 660 sf Storage= 1,132 cf

Plug-Flow detention time= 31.1 min calculated for 0.315 af (99% of inflow)
Center-of-Mass det. time= 27.2 min (822.2 - 795.1)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,048 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 1,348 cf Overall - 300 cf Embedded = 1,048 cf
#2	58.50'	30 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 75 cf Overall x 40.0% Voids
#3	59.00'	50 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 199 cf Overall x 25.0% Voids
#4	60.33'	5 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 26 cf Overall x 20.0% Voids
		1,132 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
60.50	150	300	300
61.00	236	97	397
62.00	503	370	766
63.00	660	582	1,348

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	150	0	0
59.00	150	75	75

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	150	0	0
60.33	150	199	199

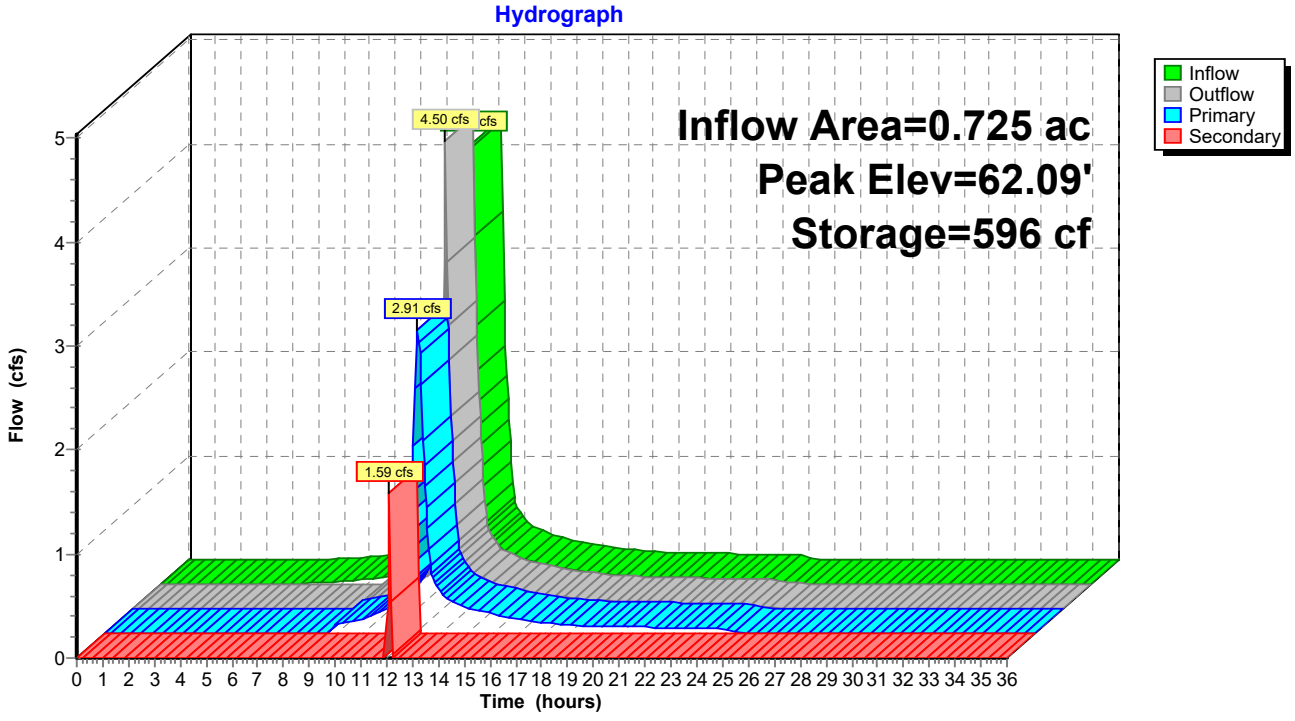
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.33	150	0	0
60.50	150	26	26

Device	Routing	Invert	Outlet Devices
#1	Device 3	58.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	62.00'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	58.50'	**8.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 58.50' / 58.40' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#4	Device 3	61.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.91 cfs @ 12.10 hrs HW=62.09' TW=54.59' (Dynamic Tailwater)
└─**3=Culvert** (Passes 2.91 cfs of 3.03 cfs potential flow)
  └─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 2.90 cfs @ 3.69 fps)

Secondary OutFlow Max=1.59 cfs @ 12.10 hrs HW=62.09' TW=54.59' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.59 cfs @ 0.72 fps)

Pond 1P: rain garden#1 cascading



Summary for Pond 2P: rain garden#2 cascading

Inflow Area = 0.966 ac, 61.39% Impervious, Inflow Depth > 5.06" for 100 yr event
Inflow = 5.76 cfs @ 12.10 hrs, Volume= 0.407 af
Outflow = 5.30 cfs @ 12.12 hrs, Volume= 0.400 af, Atten= 8%, Lag= 1.5 min
Primary = 3.54 cfs @ 12.12 hrs, Volume= 0.387 af
Secondary = 1.77 cfs @ 12.12 hrs, Volume= 0.014 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 54.61' @ 12.12 hrs Surf.Area= 1,080 sf Storage= 1,315 cf
Flood Elev= 55.00' Surf.Area= 1,326 sf Storage= 1,784 cf

Plug-Flow detention time= 44.3 min calculated for 0.400 af (98% of inflow)
Center-of-Mass det. time= 28.7 min (848.2 - 819.6)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	1,557 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 2,357 cf Overall - 800 cf Embedded = 1,557 cf
#2	51.00'	80 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 200 cf Overall x 40.0% Voids
#3	51.50'	133 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 532 cf Overall x 25.0% Voids
#4	52.83'	14 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 68 cf Overall x 20.0% Voids
		1,784 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
53.00	400	800	800
54.00	694	547	1,347
55.00	1,326	1,010	2,357

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	400	0	0
51.50	400	200	200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	400	0	0
52.83	400	532	532

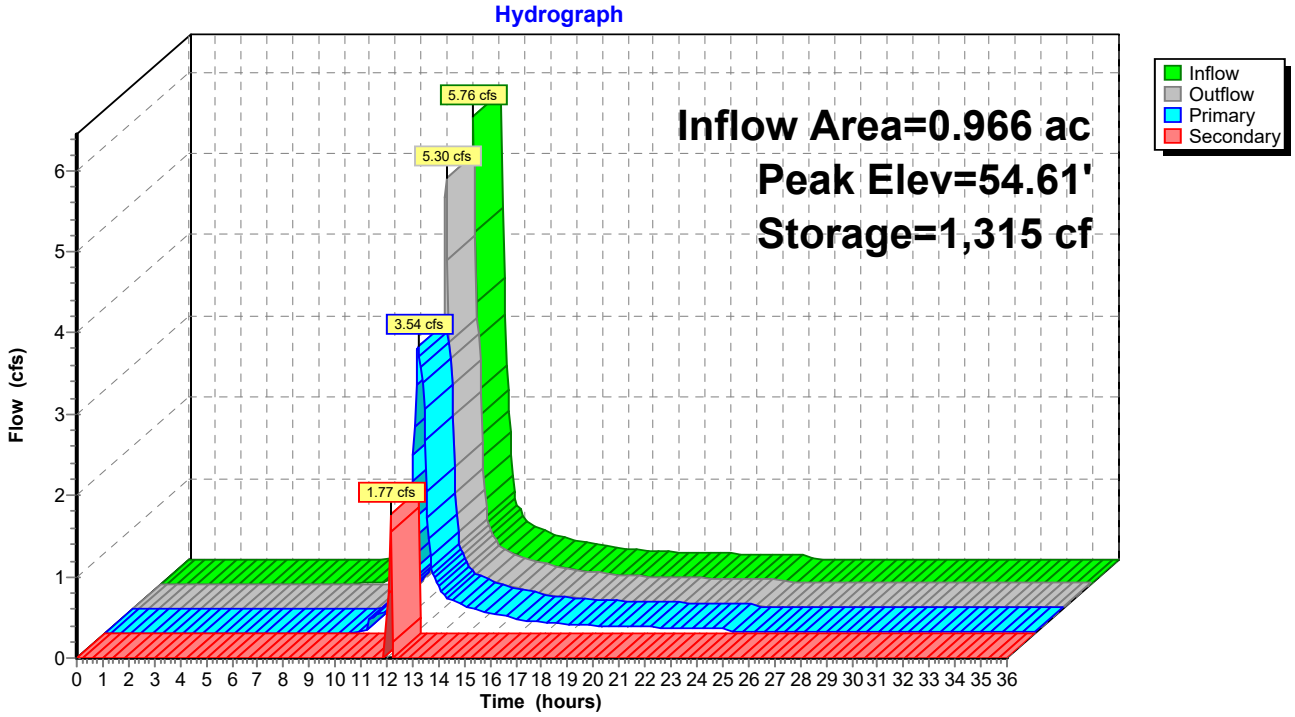
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
52.83	400	0	0
53.00	400	68	68

Device	Routing	Invert	Outlet Devices
#1	Device 3	51.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Secondary	54.50'	**25.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	51.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 51.00' / 50.88' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#4	Device 3	53.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.49 cfs @ 12.12 hrs HW=54.59' TW=49.02' (Dynamic Tailwater)
└─**3=Culvert** (Passes 3.49 cfs of 6.64 cfs potential flow)
  ├─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 3.46 cfs @ 4.41 fps)

Secondary OutFlow Max=1.57 cfs @ 12.12 hrs HW=54.59' TW=49.02' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.57 cfs @ 0.72 fps)

Pond 2P: rain garden#2 cascading



Summary for Pond 3P: rain garden#3 cascading

Inflow Area = 1.153 ac, 51.43% Impervious, Inflow Depth > 4.60" for 100 yr event
Inflow = 5.85 cfs @ 12.12 hrs, Volume= 0.442 af
Outflow = 5.83 cfs @ 12.14 hrs, Volume= 0.428 af, Atten= 0%, Lag= 1.0 min
Primary = 5.83 cfs @ 12.14 hrs, Volume= 0.428 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 49.03' @ 12.14 hrs Surf.Area= 969 sf Storage= 1,147 cf
Flood Elev= 50.00' Surf.Area= 1,373 sf Storage= 2,283 cf

Plug-Flow detention time= 55.2 min calculated for 0.428 af (97% of inflow)
Center-of-Mass det. time= 25.0 min (873.5 - 848.5)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	1,944 cf	**Rain Garden Envelope (Prismatic)** Listed below (Recalc) 3,144 cf Overall - 1,200 cf Embedded = 1,944 cf
#2	46.00'	120 cf	**crush stone (Prismatic)** Listed below (Recalc) Inside #1 300 cf Overall x 40.0% Voids
#3	46.50'	199 cf	**Bio Media (Prismatic)** Listed below (Recalc) Inside #1 798 cf Overall x 25.0% Voids
#4	47.83'	20 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 102 cf Overall x 20.0% Voids
		2,283 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
48.00	600	1,200	1,200
49.00	957	779	1,979
50.00	1,373	1,165	3,144

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	600	0	0
46.50	600	300	300

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.50	600	0	0
47.83	600	798	798

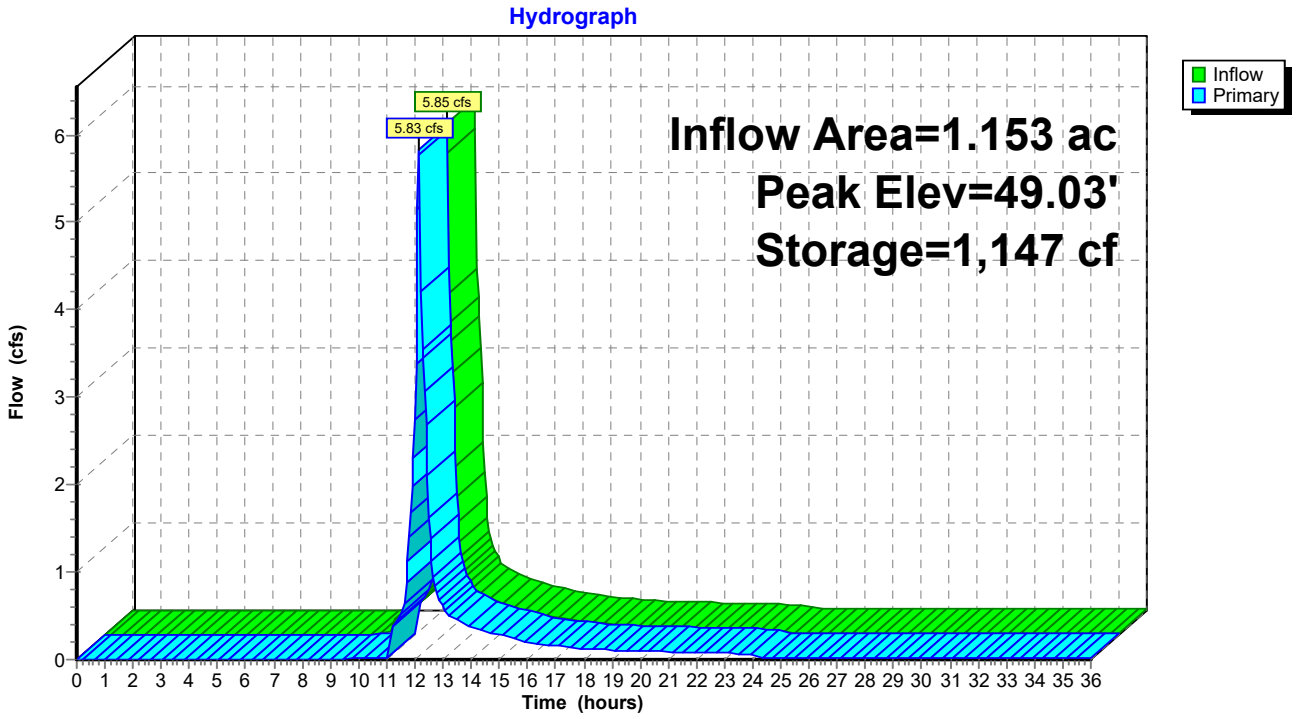
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.83	600	0	0
48.00	600	102	102

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	48.75'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#3 Primary 46.00' **15.0" Round Culvert**
L= 26.0' CPP, projecting, no headwall, Ke= 0.900
Inlet / Outlet Invert= 46.00' / 45.87' S= 0.0050 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=5.64 cfs @ 12.14 hrs HW=49.02' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 5.64 cfs of 7.22 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)
└**2=Orifice/Grate** (Weir Controls 5.62 cfs @ 1.71 fps)

Pond 3P: rain garden#3 cascading



Summary for Pond 4P: UGS-1

Inflow Area = 1.685 ac, 60.12% Impervious, Inflow Depth = 5.10" for 100 yr event
Inflow = 9.49 cfs @ 12.09 hrs, Volume= 0.716 af
Outflow = 8.73 cfs @ 12.14 hrs, Volume= 0.695 af, Atten= 8%, Lag= 2.9 min
Discarded = 0.04 cfs @ 7.20 hrs, Volume= 0.104 af
Primary = 8.69 cfs @ 12.14 hrs, Volume= 0.590 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.90' @ 12.14 hrs Surf.Area= 1,672 sf Storage= 4,651 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 79.1 min (872.2 - 793.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.50'	2,099 cf	**29.92'W x 55.89'L x 5.50'H Field A** 9,196 cf Overall - 3,198 cf Embedded = 5,998 cf x 35.0% Voids
#2A	40.25'	3,198 cf	**ADS_StormTech MC-3500 d +Cap** x 28 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 28 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		5,297 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	39.50'	**24.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 39.50' / 39.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	43.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	39.50'	**1.020 in/hr Exfiltration over Surface area**
#4	Device 1	41.83'	**8.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.04 cfs @ 7.20 hrs HW=39.56' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=8.39 cfs @ 12.14 hrs HW=43.87' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 8.39 cfs of 27.77 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.80 cfs @ 1.70 fps)
  └**4=Orifice/Grate** (Orifice Controls 6.59 cfs @ 6.29 fps)

Pond 4P: UGS-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

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

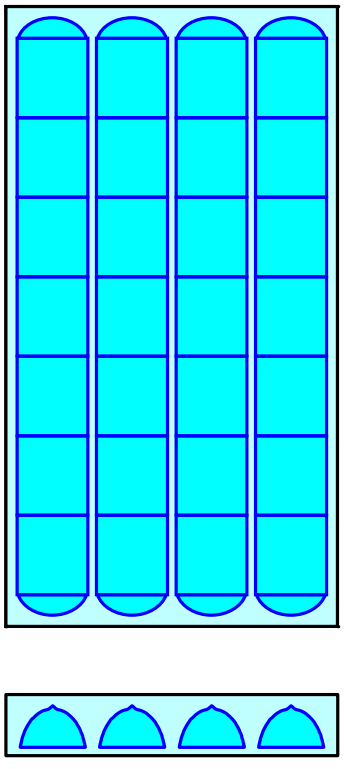
7 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 53.89' Row Length +12.0" End Stone x 2 = 55.89' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

28 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 3,197.9 cf Chamber Storage

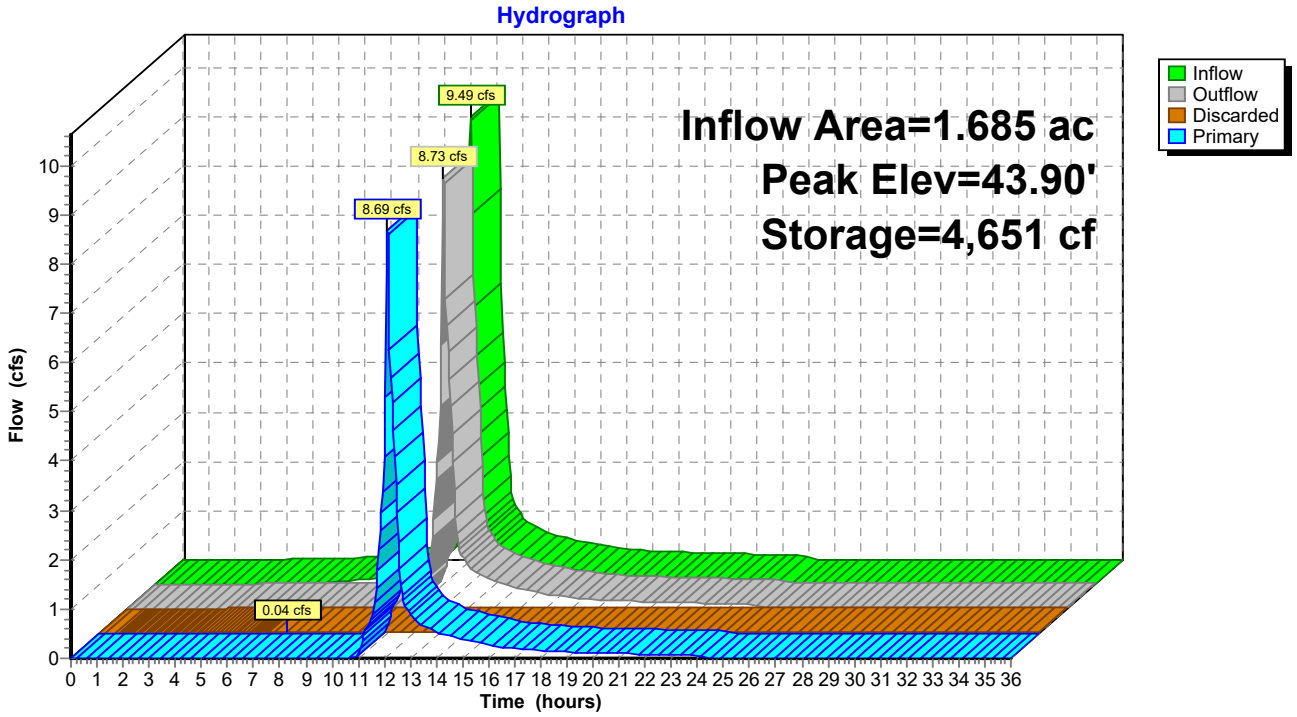
9,196.2 cf Field - 3,197.9 cf Chambers = 5,998.4 cf Stone x 35.0% Voids = 2,099.4 cf Stone Storage

Chamber Storage + Stone Storage = 5,297.3 cf = 0.122 af
Overall Storage Efficiency = 57.6%
Overall System Size = 55.89' x 29.92' x 5.50'

28 Chambers
340.6 cy Field
222.2 cy Stone



Pond 4P: UGS-1


Hydrograph
Inflow Area=1.685 ac
Peak Elev=43.90'
Storage=4,651 cf
9.49 cfs
8.73 cfs
8.69 cfs
0.04 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond BB 01 B: BB 01 B

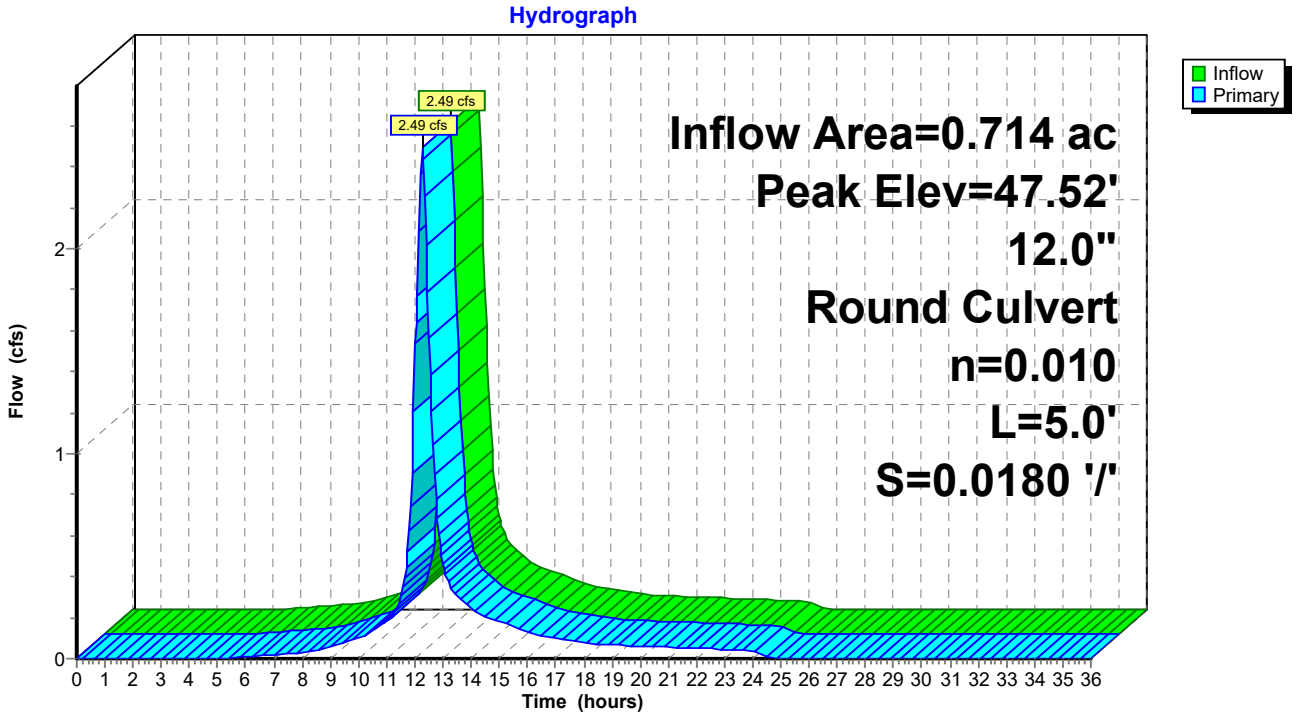
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 4.75" for 100 yr event
Inflow = 2.49 cfs @ 12.26 hrs, Volume= 0.283 af
Outflow = 2.49 cfs @ 12.26 hrs, Volume= 0.283 af, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.26 hrs, Volume= 0.283 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.52' @ 12.55 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.81' S= 0.0180 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.92 cfs @ 12.26 hrs HW=47.13' TW=46.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.92 cfs @ 2.45 fps)

Pond BB 01 B: BB 01 B



Summary for Pond BB 01 S: BB 01 S

Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 4.75" for 100 yr event
Inflow = 2.49 cfs @ 12.26 hrs, Volume= 0.283 af
Outflow = 1.38 cfs @ 12.55 hrs, Volume= 0.283 af, Atten= 45%, Lag= 17.4 min
Primary = 1.38 cfs @ 12.55 hrs, Volume= 0.283 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.40' @ 12.55 hrs Surf.Area= 0 sf Storage= 2,846 cf

Plug-Flow detention time= 25.8 min calculated for 0.283 af (100% of inflow)
Center-of-Mass det. time= 25.4 min (837.6 - 812.2)

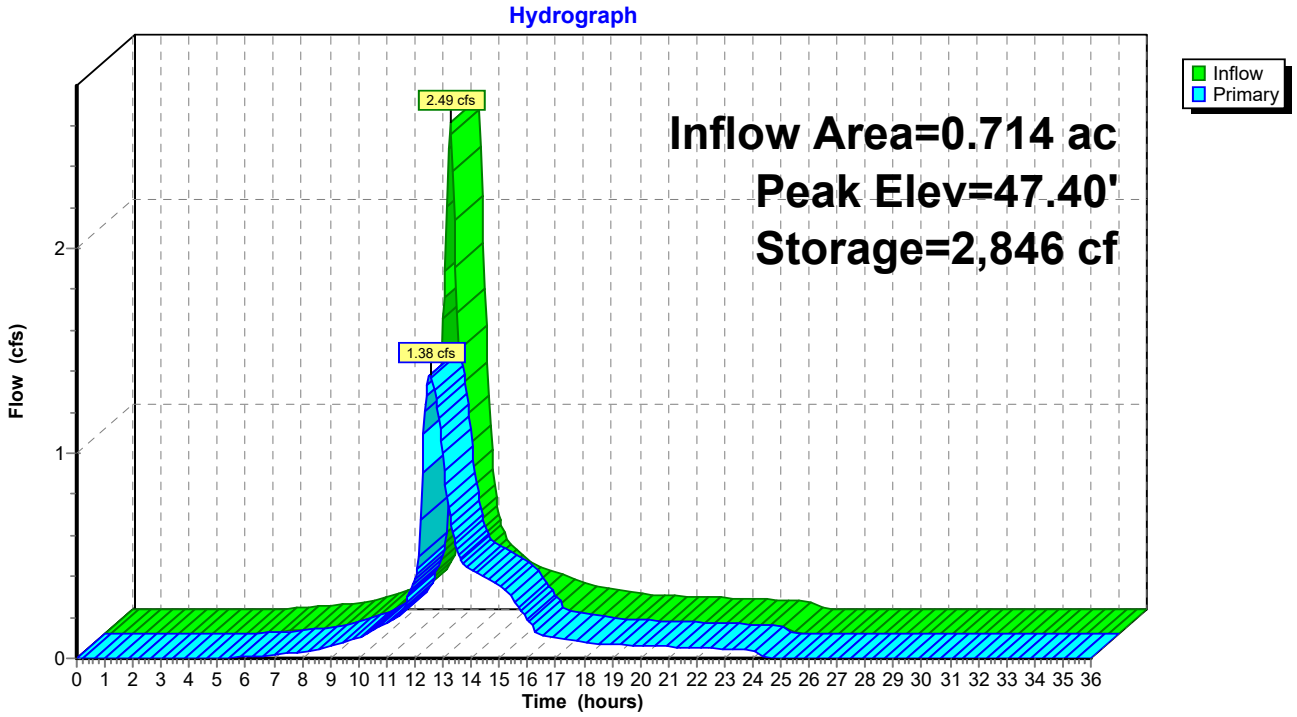
Volume	Invert	Avail.Storage	Storage Description
#1	44.97'	3,256 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.97	0	0
45.30	16	16
45.80	236	252
46.30	825	1,077
46.80	876	1,953
47.30	792	2,745
47.80	511	3,256

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**4.0" Round Culvert** L= 8.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 44.87' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	46.40'	**6.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.30' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Primary OutFlow Max=1.38 cfs @ 12.55 hrs HW=47.40' TW=45.59' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.56 cfs @ 6.47 fps)
2=Culvert (Inlet Controls 0.82 cfs @ 4.17 fps)

Pond BB 01 S: BB 01 S



Summary for Pond BB 06 B: BB 06 B

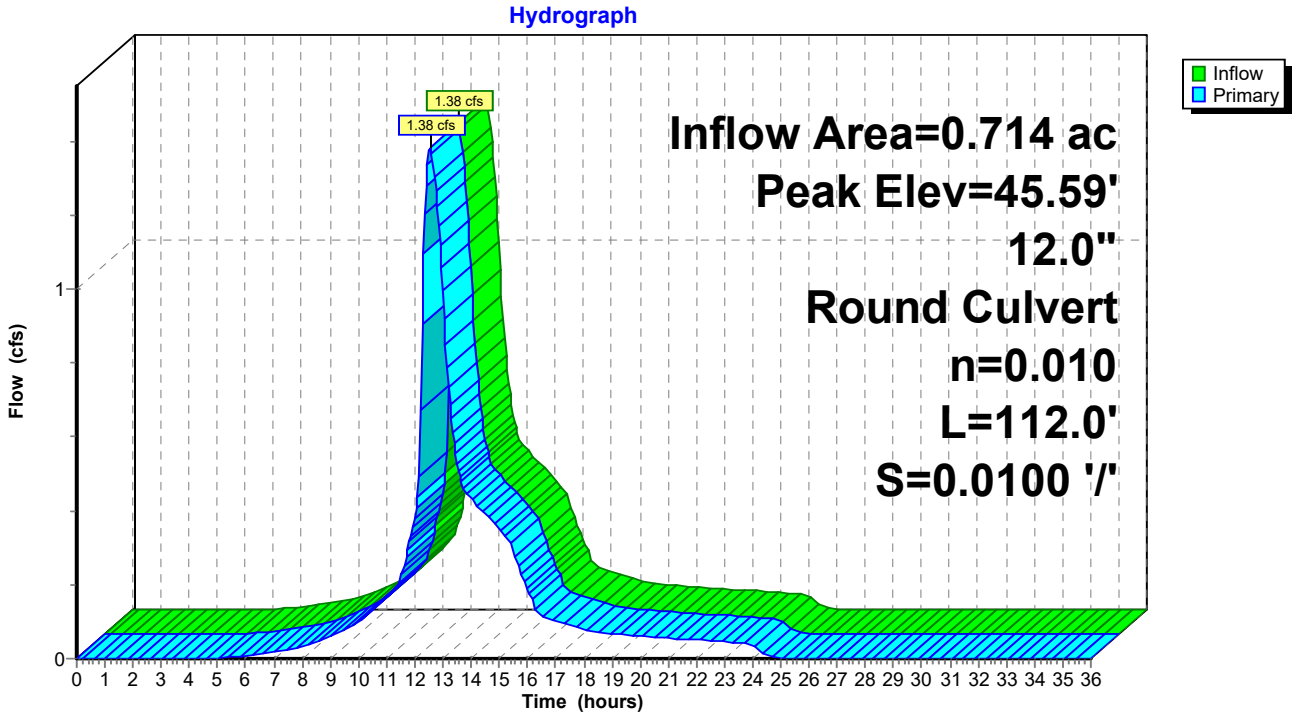
Inflow Area = 0.714 ac, 1.93% Impervious, Inflow Depth = 4.75" for 100 yr event
Inflow = 1.38 cfs @ 12.55 hrs, Volume= 0.283 af
Outflow = 1.38 cfs @ 12.55 hrs, Volume= 0.283 af, Atten= 0%, Lag= 0.0 min
Primary = 1.38 cfs @ 12.55 hrs, Volume= 0.283 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 45.59' @ 12.55 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.97'	**12.0" Round Culvert** L= 112.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.97' / 43.85' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.38 cfs @ 12.55 hrs HW=45.59' TW=43.33' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.38 cfs @ 2.69 fps)

Pond BB 06 B: BB 06 B



Summary for Pond BB 11 B: BB 11 B

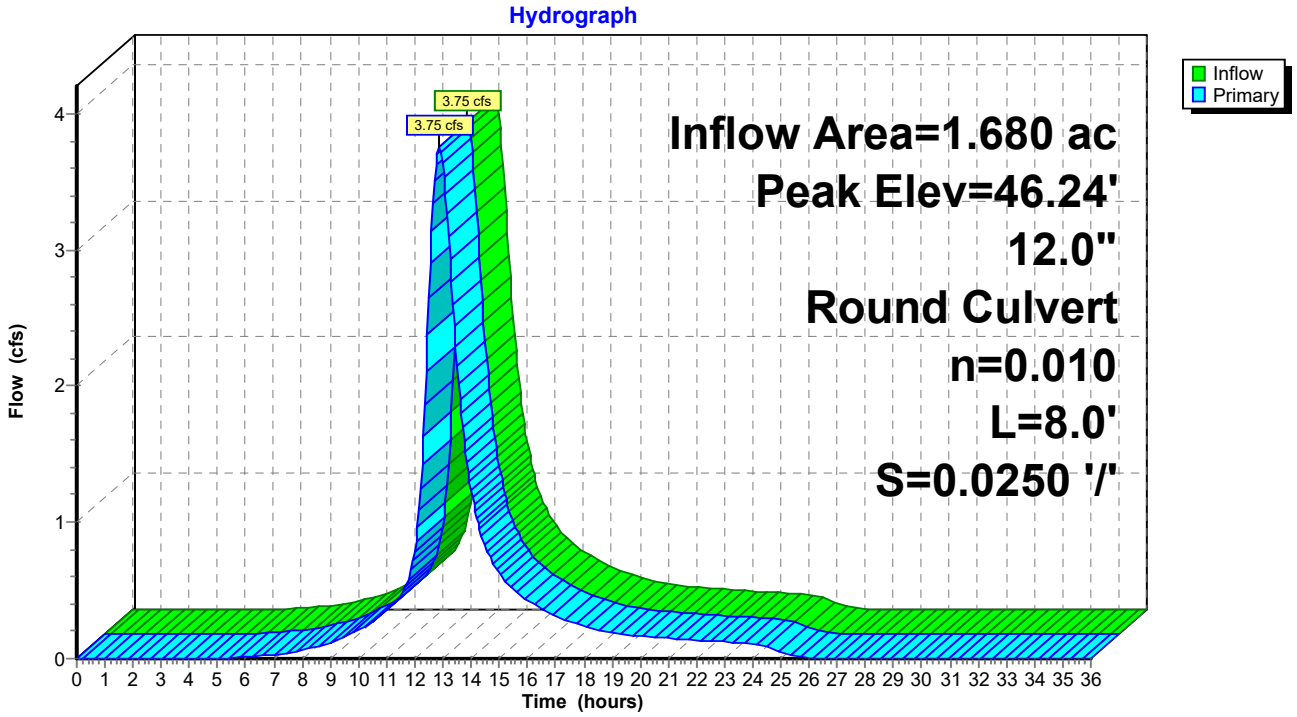
Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 5.25" for 100 yr event
Inflow = 3.75 cfs @ 12.87 hrs, Volume= 0.736 af
Outflow = 3.75 cfs @ 12.87 hrs, Volume= 0.736 af, Atten= 0%, Lag= 0.0 min
Primary = 3.75 cfs @ 12.87 hrs, Volume= 0.736 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 46.24' @ 13.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.00'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.00' / 43.80' S= 0.0250 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=3.54 cfs @ 12.87 hrs HW=46.01' TW=45.13' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 3.54 cfs @ 4.50 fps)

Pond BB 11 B: BB 11 B



Summary for Pond BB 11 S: BB 11 S

Inflow Area = 1.680 ac, 0.00% Impervious, Inflow Depth = 5.25" for 100 yr event
Inflow = 3.75 cfs @ 12.87 hrs, Volume= 0.736 af
Outflow = 3.24 cfs @ 13.16 hrs, Volume= 0.736 af, Atten= 14%, Lag= 17.6 min
Primary = 3.24 cfs @ 13.16 hrs, Volume= 0.736 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 45.49' @ 13.16 hrs Surf.Area= 0 sf Storage= 3,794 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 11.3 min (862.8 - 851.5)

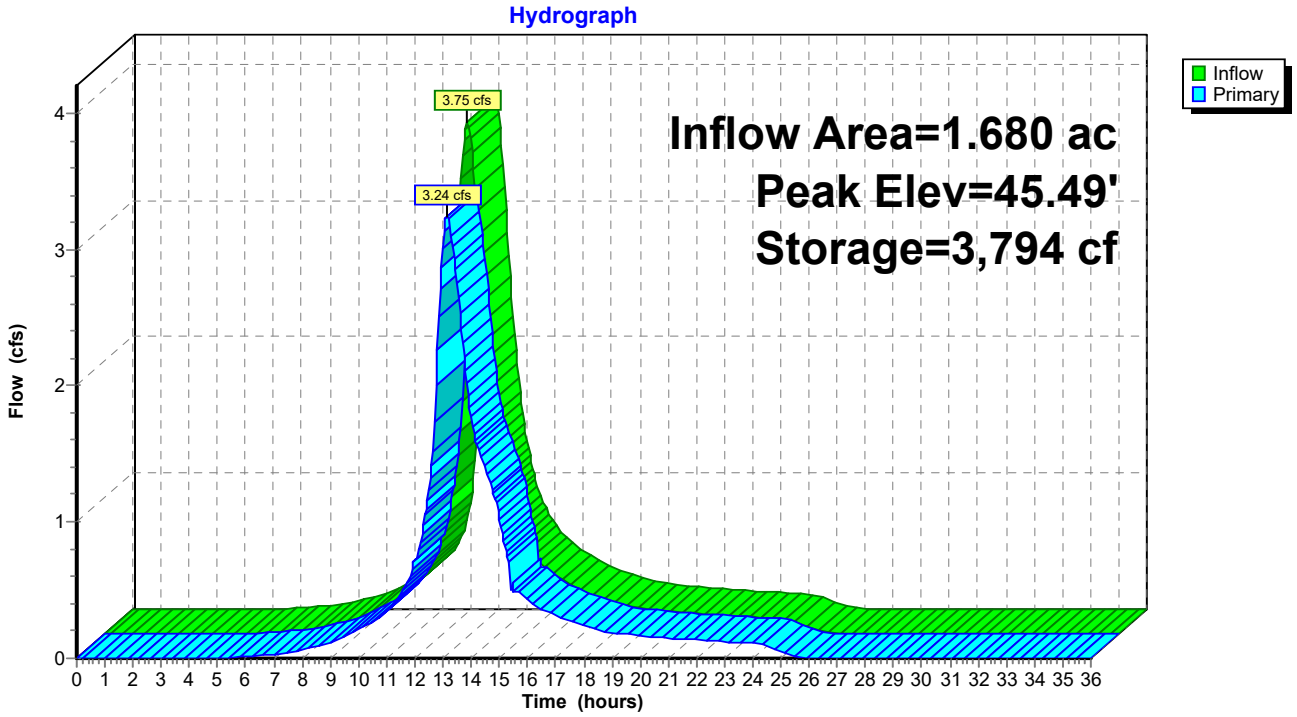
Volume	Invert	Avail.Storage	Storage Description
#1	42.97'	4,778 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.97	0	0
43.30	16	16
43.80	481	497
44.30	963	1,460
44.80	1,019	2,479
45.30	1,085	3,564
45.80	603	4,167
46.30	611	4,778

Device	Routing	Invert	Outlet Devices
#1	Primary	42.97'	**4.0" Round Culvert** L= 16.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.97' / 42.81' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	39.70'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.70' / 39.60' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Primary	44.50'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.50' / 44.40' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=3.24 cfs @ 13.16 hrs HW=45.49' TW=43.59' (Dynamic Tailwater)
- **1=Culvert** (Outlet Controls 0.58 cfs @ 6.63 fps)
- **2=Culvert** (Inlet Controls 1.30 cfs @ 6.64 fps)
- **3=Culvert** (Inlet Controls 1.36 cfs @ 3.90 fps)

Pond BB 11 S: BB 11 S



Summary for Pond PR-4: PR-4

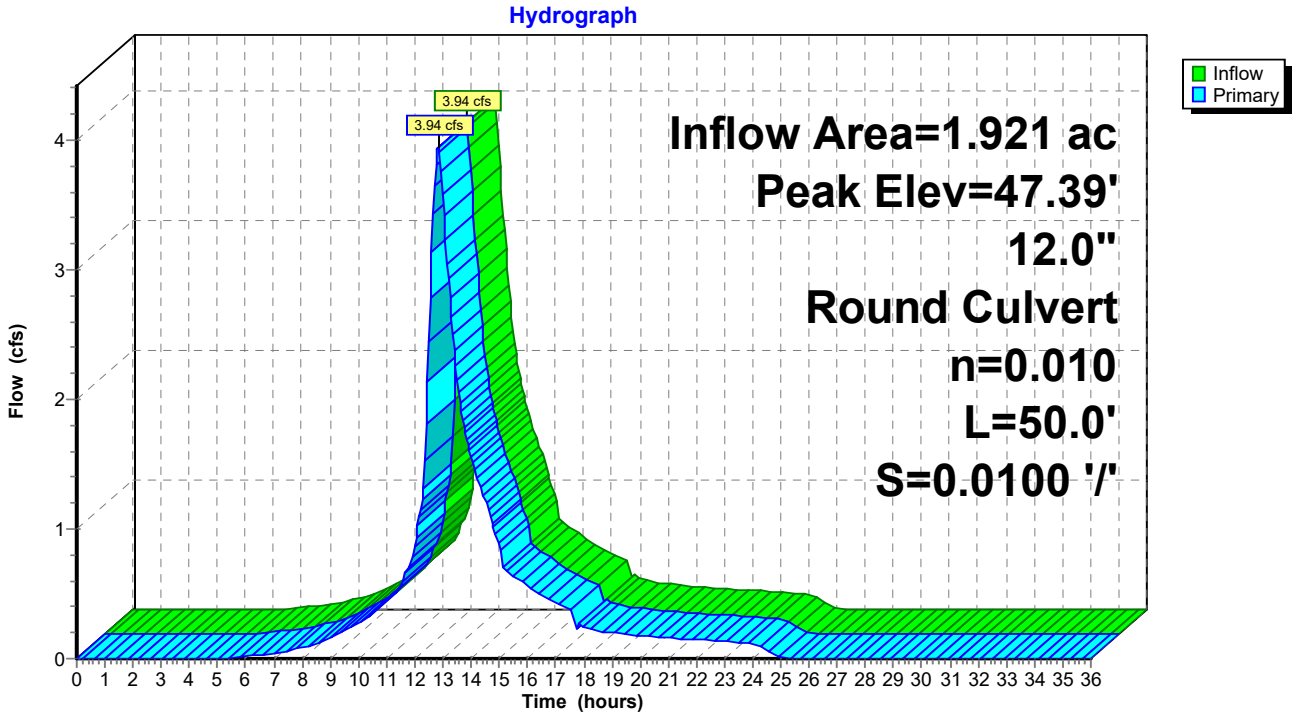
Inflow Area = 1.921 ac, 1.30% Impervious, Inflow Depth = 5.13" for 100 yr event
Inflow = 3.94 cfs @ 12.83 hrs, Volume= 0.821 af
Outflow = 3.94 cfs @ 12.83 hrs, Volume= 0.821 af, Atten= 0%, Lag= 0.0 min
Primary = 3.94 cfs @ 12.83 hrs, Volume= 0.821 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.39' @ 12.83 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.80'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.80' / 45.30' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=3.93 cfs @ 12.83 hrs HW=47.38' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 3.93 cfs @ 5.01 fps)

Pond PR-4: PR-4



Summary for Pond PR-5: PR-5

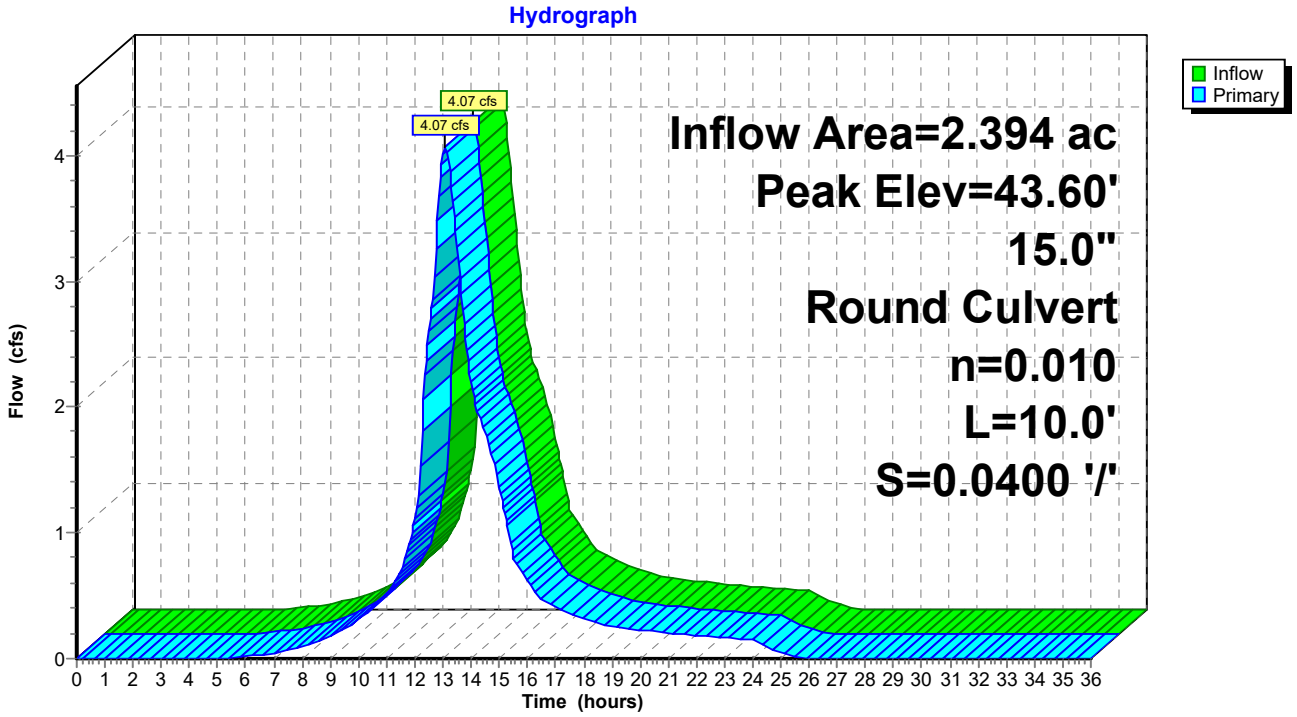
Inflow Area = 2.394 ac, 0.58% Impervious, Inflow Depth = 5.10" for 100 yr event
Inflow = 4.07 cfs @ 13.09 hrs, Volume= 1.018 af
Outflow = 4.07 cfs @ 13.09 hrs, Volume= 1.018 af, Atten= 0%, Lag= 0.0 min
Primary = 4.07 cfs @ 13.09 hrs, Volume= 1.018 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 43.60' @ 13.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.50'	**15.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.10' S= 0.0400 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=4.06 cfs @ 13.09 hrs HW=43.60' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.06 cfs @ 3.56 fps)

Pond PR-5: PR-5



Summary for Pond SB 01 B: SB 01 B

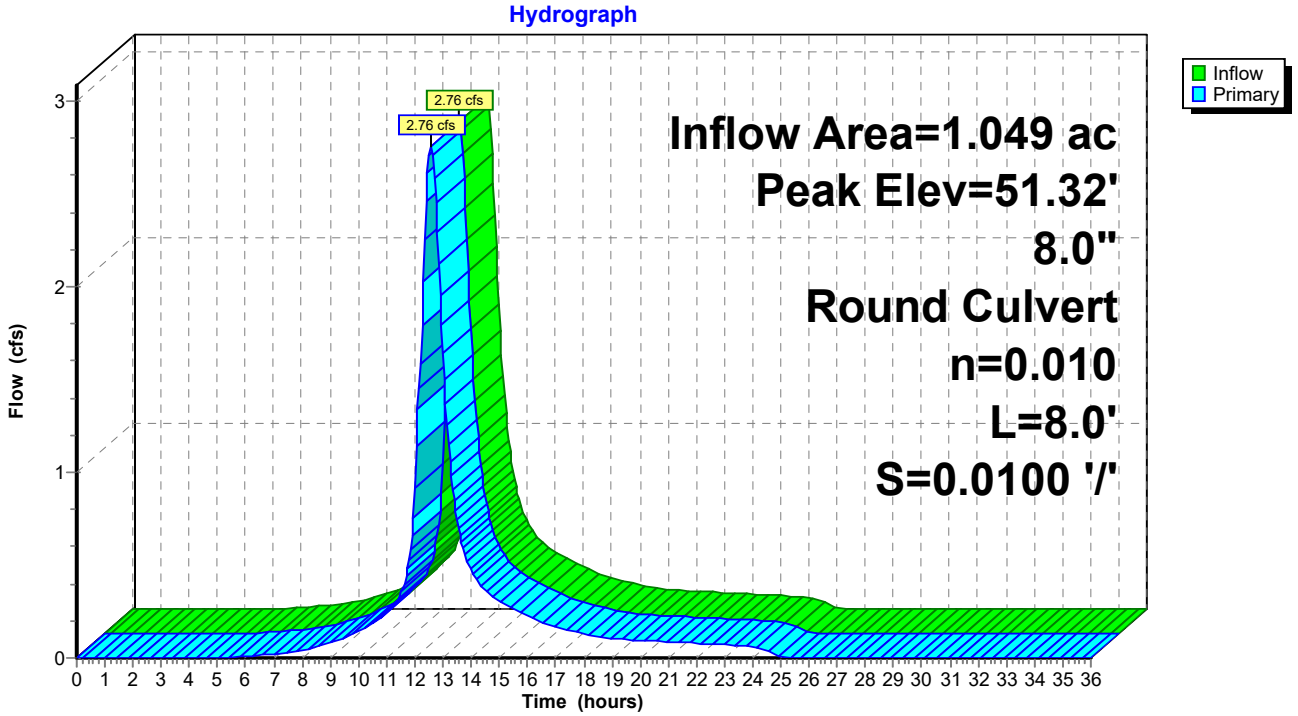
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 5.03" for 100 yr event
Inflow = 2.76 cfs @ 12.56 hrs, Volume= 0.440 af
Outflow = 2.76 cfs @ 12.56 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 12.56 hrs, Volume= 0.440 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 51.32' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=2.75 cfs @ 12.56 hrs HW=51.31' TW=48.41' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 2.75 cfs @ 7.88 fps)

Pond SB 01 B: SB 01 B



Summary for Pond SB 01 S: SB 01 S

Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 5.03" for 100 yr event
Inflow = 2.76 cfs @ 12.56 hrs, Volume= 0.440 af
Outflow = 1.99 cfs @ 12.87 hrs, Volume= 0.440 af, Atten= 28%, Lag= 18.3 min
Primary = 1.99 cfs @ 12.87 hrs, Volume= 0.440 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 48.98' @ 12.90 hrs Surf.Area= 0 sf Storage= 3,258 cf

Plug-Flow detention time= 16.0 min calculated for 0.439 af (100% of inflow)
Center-of-Mass det. time= 16.0 min (846.5 - 830.5)

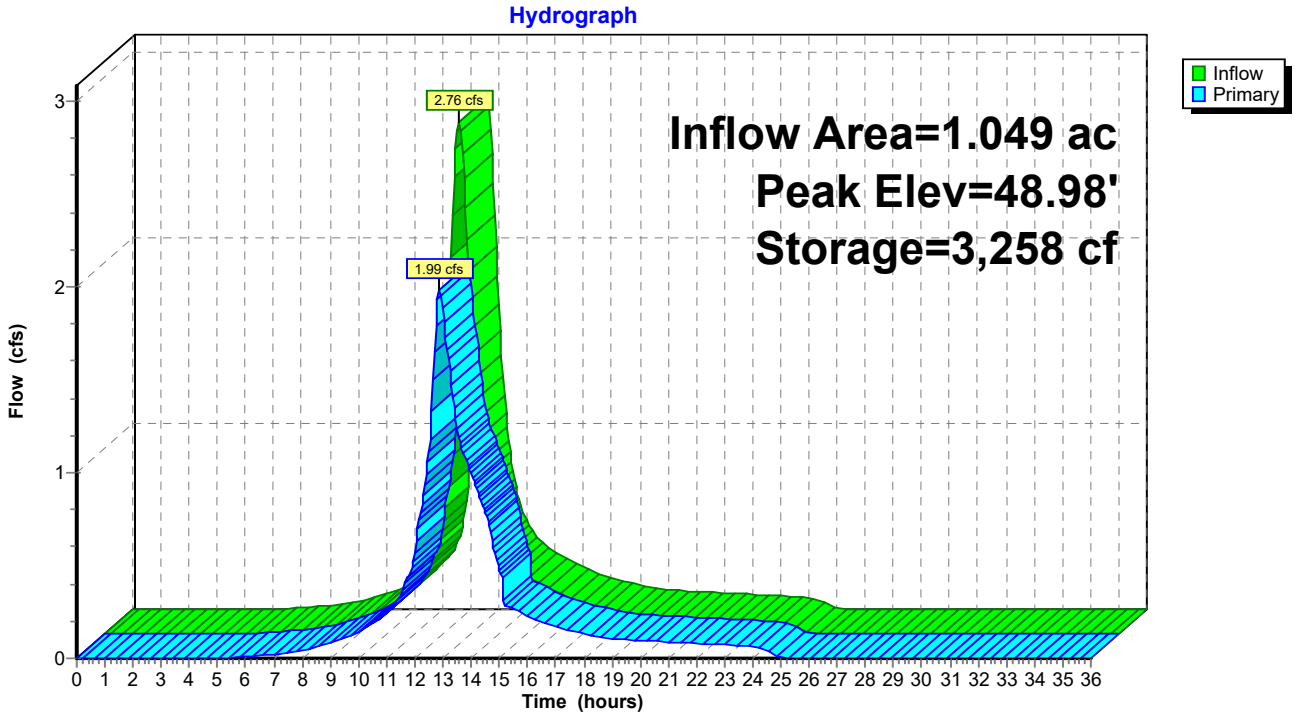
Volume	Invert	Avail.Storage	Storage Description
#1	46.30'	4,121 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.30	0	0
46.80	16	16
47.30	386	402
47.80	837	1,239
48.30	886	2,125
48.80	943	3,068
49.30	523	3,591
49.80	530	4,121

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**6.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.20' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#2	Primary	48.30'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.30' / 48.22' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=1.96 cfs @ 12.87 hrs HW=48.97' TW=47.66' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.09 cfs @ 5.53 fps)
2=Culvert (Barrel Controls 0.87 cfs @ 3.07 fps)

Pond SB 01 S: SB 01 S



Summary for Pond SB 03 B: SB 03B

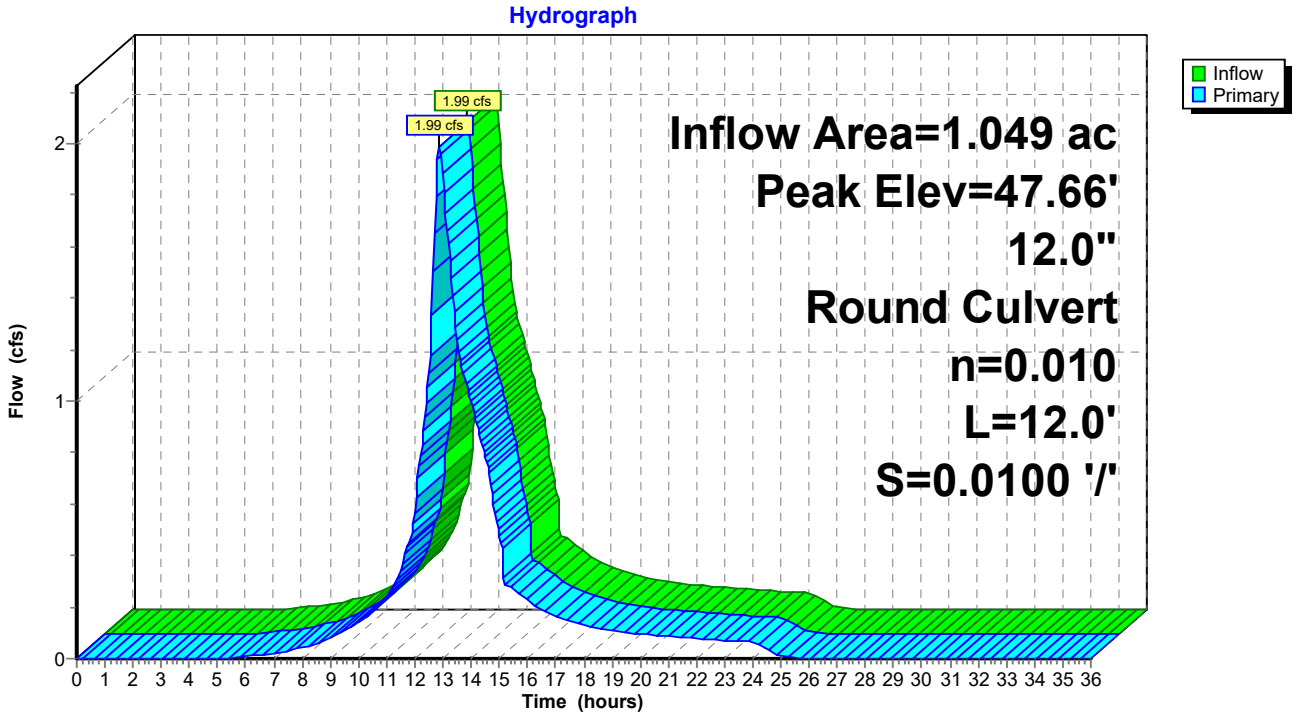
Inflow Area = 1.049 ac, 2.38% Impervious, Inflow Depth = 5.03" for 100 yr event
Inflow = 1.99 cfs @ 12.87 hrs, Volume= 0.440 af
Outflow = 1.99 cfs @ 12.87 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min
Primary = 1.99 cfs @ 12.87 hrs, Volume= 0.440 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.66' @ 12.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.25'	**12.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.25' / 46.13' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=2.02 cfs @ 12.87 hrs HW=47.66' TW=47.37' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.02 cfs @ 2.57 fps)

Pond SB 03 B: SB 03B



Summary for Pond SB 11 B: SB 11 B

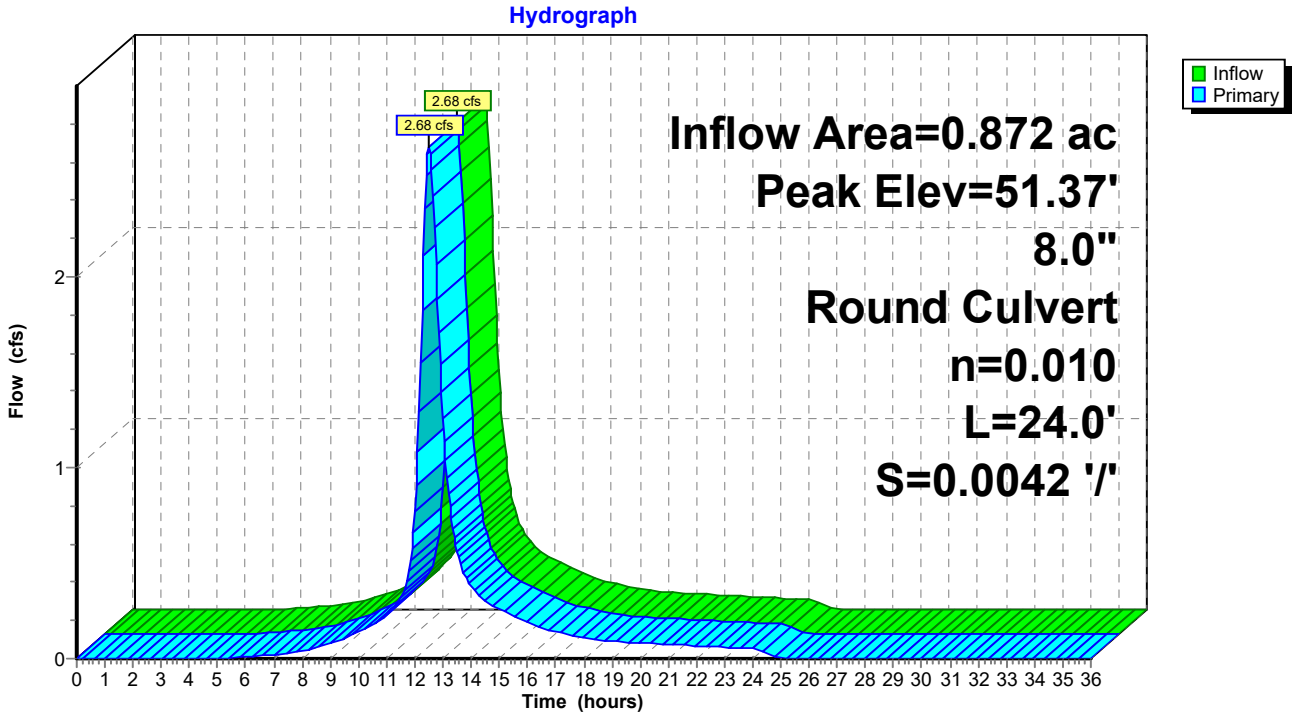
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 5.25" for 100 yr event
Inflow = 2.68 cfs @ 12.50 hrs, Volume= 0.382 af
Outflow = 2.68 cfs @ 12.50 hrs, Volume= 0.382 af, Atten= 0%, Lag= 0.0 min
Primary = 2.68 cfs @ 12.50 hrs, Volume= 0.382 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 51.37' @ 12.50 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	48.50'	**8.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.50' / 48.40' S= 0.0042 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=2.68 cfs @ 12.50 hrs HW=51.37' TW=48.74' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.68 cfs @ 7.66 fps)

Pond SB 11 B: SB 11 B



Summary for Pond SB 11 S: SB 11 S

Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 5.25" for 100 yr event
Inflow = 2.68 cfs @ 12.50 hrs, Volume= 0.382 af
Outflow = 2.01 cfs @ 12.75 hrs, Volume= 0.382 af, Atten= 25%, Lag= 15.2 min
Primary = 2.01 cfs @ 12.75 hrs, Volume= 0.382 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 49.23' @ 12.77 hrs Surf.Area= 0 sf Storage= 3,318 cf

Plug-Flow detention time= 29.6 min calculated for 0.381 af (100% of inflow)
Center-of-Mass det. time= 29.5 min (853.7 - 824.2)

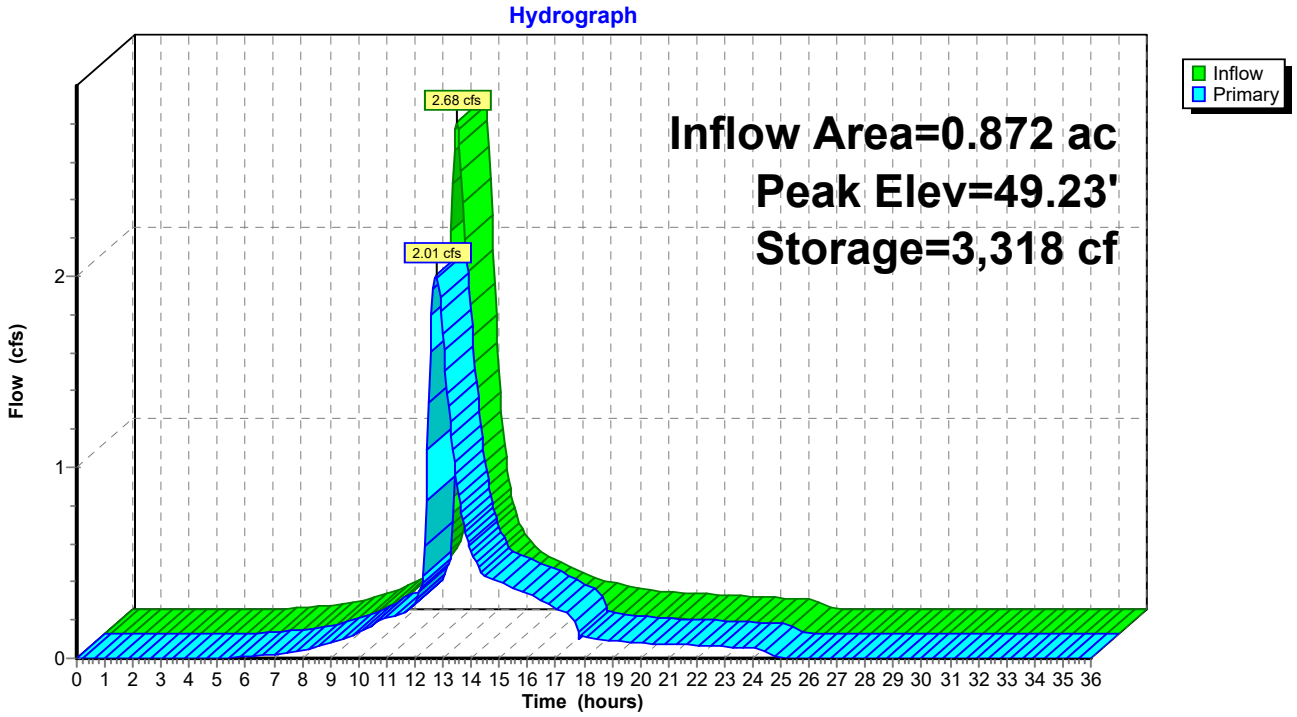
Volume	Invert	Avail.Storage	Storage Description
#1	46.80'	3,953 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.80	0	0
47.30	16	16
47.80	888	904
48.30	944	1,848
48.80	1,001	2,849
49.30	544	3,393
49.80	560	3,953

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**4.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.72' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf
#2	Primary	48.10'	**8.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.10' / 48.00' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=2.00 cfs @ 12.75 hrs HW=49.23' TW=47.81' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.50 cfs @ 5.73 fps)
2=Culvert (Inlet Controls 1.50 cfs @ 4.29 fps)

Pond SB 11 S: SB 11 S



Summary for Pond SB 12 B: SB 12 B

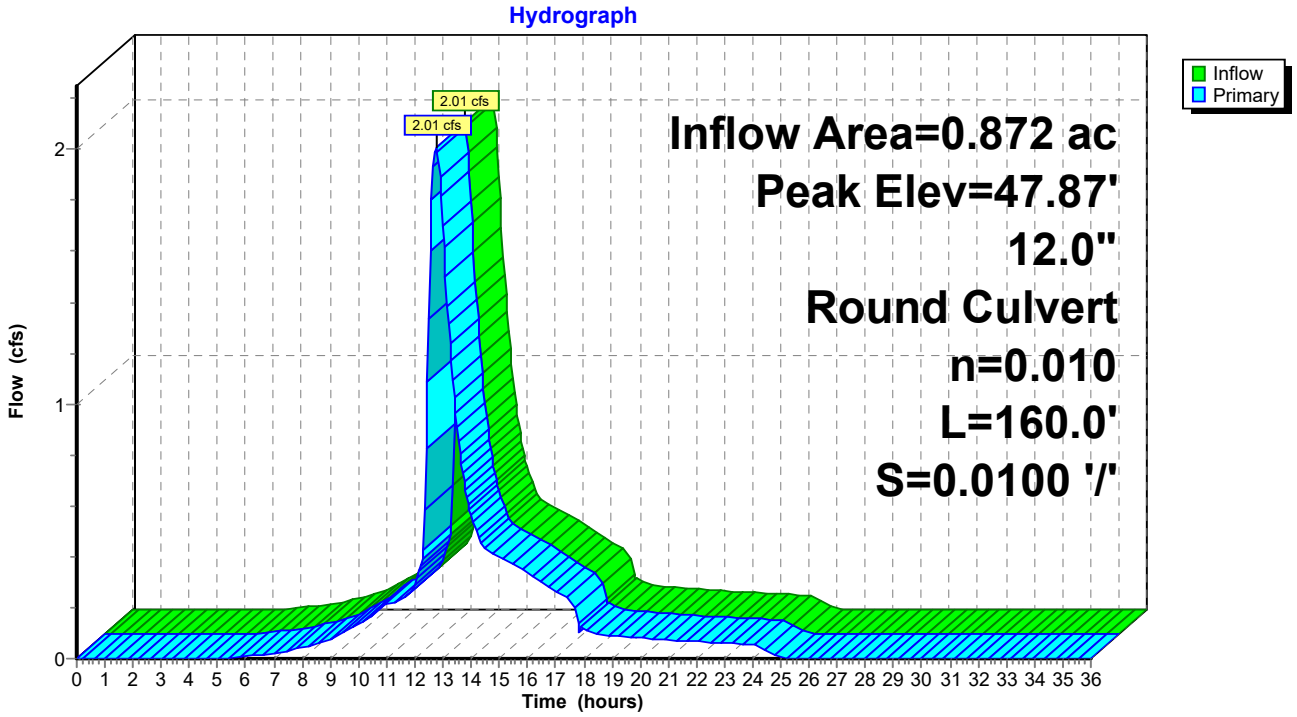
Inflow Area = 0.872 ac, 0.00% Impervious, Inflow Depth = 5.25" for 100 yr event
Inflow = 2.01 cfs @ 12.75 hrs, Volume= 0.382 af
Outflow = 2.01 cfs @ 12.75 hrs, Volume= 0.382 af, Atten= 0%, Lag= 0.0 min
Primary = 2.01 cfs @ 12.75 hrs, Volume= 0.382 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 47.87' @ 12.86 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.80' / 45.20' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.86 cfs @ 12.75 hrs HW=47.81' TW=47.32' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.86 cfs @ 2.90 fps)

Pond SB 12 B: SB 12 B

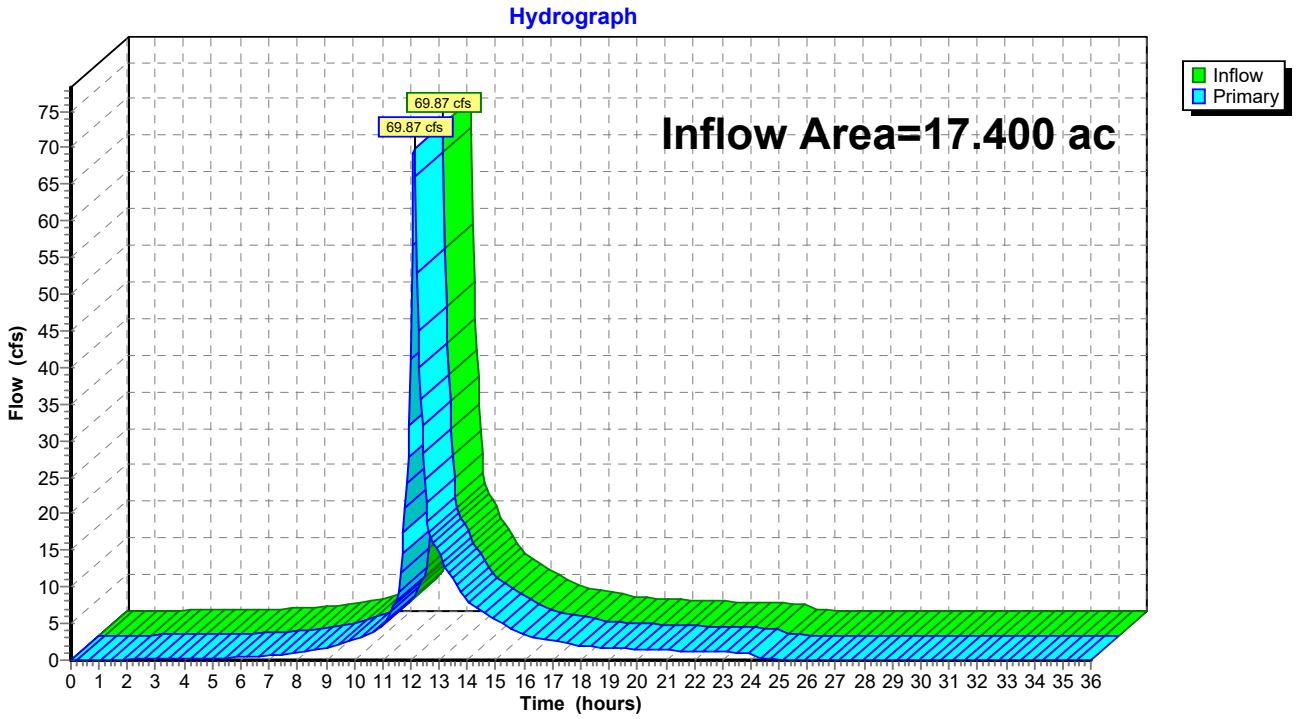


Summary for Link POA: POA

Inflow Area = 17.400 ac, 49.60% Impervious, Inflow Depth > 5.15" for 100 yr event
Inflow = 69.87 cfs @ 12.11 hrs, Volume= 7.475 af
Primary = 69.87 cfs @ 12.11 hrs, Volume= 7.475 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POA: POA



APPENDIX 3:

Test Pit Logs
Soils Report

Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Arlington
Owner Name

869 Massachusetts Ave
Street Address

53-2-4
Map/Lot #

Arlington
City

MA
State

02476
Zip Code

B. Site Information

1. (Check one) ☐ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: USDA (Source) 656 (Soil Map Unit)

Udorthents
Soil Name

Soil Limitations

Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits

Urban Land
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone (Year Published/Source) Artificial Fill (Map Unit)

Earth materials and manmade materials that have been artificially emplaced.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 1015/19 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 (Hole #) | 10/14/19 (Date) | 11:00 (Time) | Sunny, 50's (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Landscaped area (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: _____

2. Soil Parent Material: Loamy alluvium | Outwash plain (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 90" Depth Weeping from Pit | 96" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-36	Fill										
36-48	Ab	Sandy Loam	10YR3/1						Granular	Friable	
48-96	C1	Sandy Loam	2.5Y 5/4				3%	3%	Massive	Friable	

Additional Notes:
NRCS Hydrologic Soil Group B; ESHGW=37.00

Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: _____ Hole # _____ Date _____ Time _____ Weather _____ Latitude _____ Longitude:

1. Land Use: _____ (e.g., woodland, agricultural field, vacant lot, etc.) _____ Vegetation _____ Surface Stones (e.g., cobbles, stones, boulders, etc.) _____ Slope (%)

   Description of Location: _____

2. Soil Parent Material: _____ _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands _____ feet
   Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP-1	Obs. Hole # _____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	90" inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 90" inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 48" inches Lower boundary: 96" inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

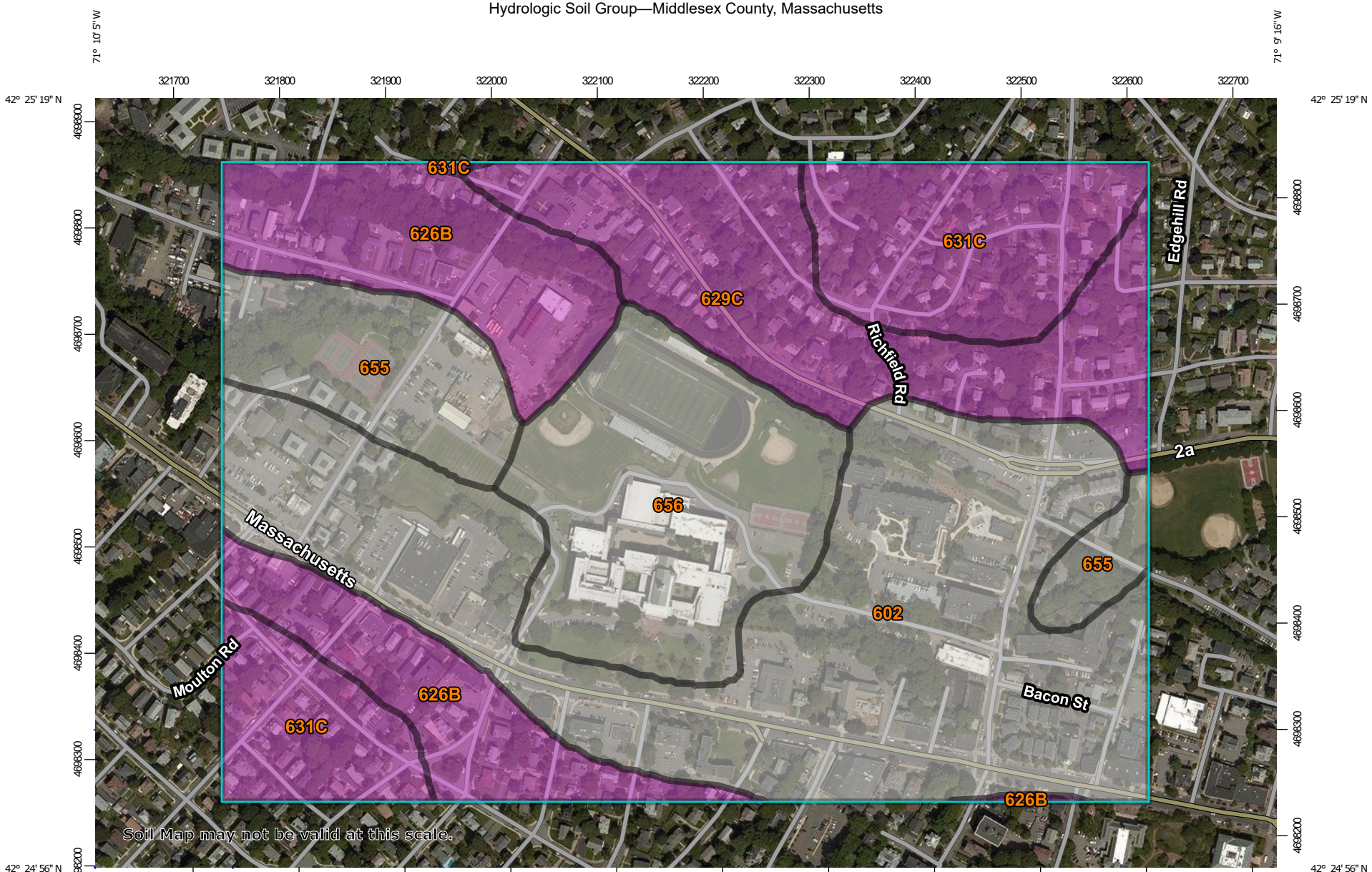
F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil 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 15.100 through 15.107.

David Scharlacken	10-15-19
Signature of Soil Evaluator	Date
David Scharlacken SE#14279	12/1/2021
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:



Map Scale: 1:5,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 18, Sep 7, 2018

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

Date(s) aerial images were photographed: Aug 10, 2014—Aug 25, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
602	Urban land		44.3	33.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	20.3	15.5%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	A	18.5	14.1%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	A	17.4	13.3%
655	Udorthents, wet substratum		11.1	8.5%
656	Udorthents-Urban land complex		19.1	14.6%
Totals for Area of Interest			**130.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX 4:
Operations and Maintenance Plan

ARLINGTON HIGH SCHOOL
CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN AND EROSION CONTROL OPERATION AND MAINTENANCE PLAN
MAY 2020

During The Construction Period the General Contractor shall be responsible for the following:

1. Erosion Control

Erosion control barriers will be placed along down-gradient portion of the site as indicated on the project plans. Additional erosion control barriers will be placed at the limit of work as needed and in any sensitive areas as work progresses.

A stockpile of additional erosion control barriers shall be kept on site at all times

2. Site Access

Site access, for construction equipment will be from Massachusetts Ave. and Mill Brook Drive via an existing access drive as shown on the phased Demolition and Soil Erosion Plans, and all construction entrances will be installed at the onset of the project.

3. Construction Staging

A construction staging area will be established by the Contractor.

4. Site Grading/Site Work

The site activities may only commence when the site is stable from erosion and all required control measures are in place and functional.

5. Slope Stabilization

All surfaces and slopes shall be checked at least once every 7 calendar days and within 24 hours of the occurrence of a storm event 0.25 inches or greater to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the General Contractor shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately or stabilized in a manner acceptable to the Conservation Commission if it is outside of the growing season. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation. If stabilization is required during the non-growing season, straw mulch, or a commercially manufactured blanket must be employed to prevent erosion.

6. Permanent Stabilization

Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 14 days after the last construction activity. The permanent seed mix, fertilizer, and mulch shall be specified on the project plans. Permanent seeding shall occur in the Spring or Fall.

7. Drainage Structures (Catch Basins, Area Drains, Manholes, WQU's)

All structures shall be inspected on a bi-weekly basis and/or after every rain storm and repairs made as necessary. Sediment shall be removed from the sump after the sediment has reached a maximum of one half the depth of the sump. The sediment shall be removed from the site and properly disposed of. Drainage structures/sumps shall be cleaned completely at the end of construction.

8. Dust and Sediment Control

Siltsacks:
Catch basin/Area drain filters shall be placed at all inlets to drainage structures as structures are installed and prior to pavement removal. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings.

Straw Wattles:
Straw bales shall be installed as indicated on the Drawings.

Bales shall be placed in a row with ends tightly abutting the adjacent wattles. Each roll shall be securely anchored in place by 2 stakes or re-bars driven through the wattles. The first stake in each roll shall be angled toward the previously laid straw wattle to force them together.

Construction Entrance:
The area of the construction entrance should be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans.

The Construction entrance shall be a minimum of 50-feet in length and 20-feet wide.

Dust Control:
A mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.

For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.

Pollution Prevention Measures

1. Before, during, and after construction, functional erosion and sedimentation controls shall be implemented to prevent the silting of the wetland areas down-gradient of the site. Straw bales, crushed stone, temporary stabilization and other controls shall be properly maintained and are not to be removed until the site is permanently stabilized. Other controls shall be added as warranted during construction to protect environmentally-sensitive areas. Sufficient extra materials (e.g. straw bales and other control materials) shall be stored on site for emergencies.

2. Silt sacks and straw bale check dams shall be installed at all existing and proposed infiltration areas to protect from soils and sediment.

3. Casting of excavated materials shall be stored away from wetland areas and sensitive land areas.

4. Any stockpiling of loose materials shall be properly stabilized to prevent erosion and siltation. Preventative controls such as straw wattles, temporary seeding/mulching and jute covering shall be implemented to prevent such an occurrence.

5. There shall be no flooding, ponding, or flood related damage caused by the project or surface run-off emanating from the project on lands of an abutter, nearby or down-gradient of the site.

6. There shall be no contaminant migration caused by the project to nearby and down-gradient properties, nearby aquifers, and nearby resource areas.

7. The contractor shall make sufficient provisions to control any unexpected drainage and erosion conditions that may arise during construction that may create damage on abutting properties. Said control measures are to be implemented at once.

8. During construction flood prevention, erosion, and sedimentation controls shall be in place before the natural ground cover is disturbed. Said controls shall be in place prior to other construction work and shall be monitored and approved by the Contractor. They shall be properly maintained and are not to be removed until the site is stabilized.

9. The Contractor shall designate a person or persons to inspect and supervise the erosion controls for the project. The Conservation Commission shall be notified as to the means to contact said individual or individuals on a 24-hour basis on all working and non-working days of the project. Said means of contact shall include at least 2 separate telephone number of said designated person or persons.

10. There shall be periodic inspection of straw wattles, and other erosion controls by the Contractor's Designee to assure their continued effectiveness.

11. The Contractor shall make adequate provisions for controlling erosion and sediment from activities that might yield water at high volumes with high suspended solid contents, such as dewatering excavations.

12. Street sweeping shall be used to keep public ways free and clear of sediment and dirt from the site activities.

Other Control Measures

Waste Materials. All trash and construction debris from the site will be hauled to an approved landfill or recycling facility. No construction waste material will be buried on the site. All personnel will receive instructions regarding the correct procedure for waste disposal. Notices describing these practices will be posted in the construction office. The site superintendent will be responsible for seeing that these procedures are followed. Employee waste and other loose materials will be collected so as to prevent the release of floatables during rainfall events.

Hazardous Waste. No Hazardous materials are expected to be encountered. The mandated State and Local permits for removal of such materials, if located, will be implemented when such materials are encountered.

After Construction, the owner shall be responsible for the following:

General Land Grading and Slopes Stabilization

All surfaces and slopes shall be checked bi-annually to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the Owner shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation.

Areas of steep slopes (2.5:1 or greater) shall be stabilized using jute mesh or a similar approved erosion blanket.

Erosion Controls

Erosion controls shall not be removed or dismantled without approval from the Engineer or Conservation Commission. Sediment deposits that are removed or left in place after the barriers have been dismantled shall be graded manually to conform to the existing topography and vegetated using seeding or other long term cover as approved in the Landscape Plan. Bare ground that cannot be permanently stabilized within 30 days shall be stabilized by temporary measures.

Street Sweeping ($500 per sweeping)

It is proposed that the parking and drive areas be swept with a wet brush street sweeper on a semi-annual basis, with at least two sweepings per year. One sweep shall be done at the end of the winter season (prior to the heavy rains), and the other sweep at the end of autumn (prior to snowfall).

Stormwater Management System

Catch Basins, Area Drains, and Drain Manholes ($500 per CB structure per inspection/cleaning):
The catch basins, drain manholes, WQU's, infiltration systems, and area drains shall be inspected semi-annually, and cleaned out when sumps are approximately one foot full. The use of "clam shells" for sediment removal shall not be allowed; a vacuum truck shall be the approved method of cleaning. Integrity and functionality of oil hoods shall also be checked at the time of the inspection.

Water Quality Unit (WQU) ($1000 per structure per inspection/cleaning):
Water Quality Unit shall be as follows and per manufacturer's recommendations:

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate. In subsequent years, inspections can be based on first-year observations
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer).
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly

Rain Garden ($750 per cleaning):

Inspection and Maintenance of Rain Gardens shall be conducted per the Bioretention Maintenance Schedule provided below from the Massachusetts Stormwater Handbook:

Bioretention Maintenance Schedule		
Activity	***Time of Year***	***Frequency***
Inspect & remove trash	Year round	Monthly
Mulch	Spring	Annually
Remove dead vegetation	Fall or Spring	Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace entire media & all vegetation	Late Spring/early Summer	As needed*

** Paying careful attention to pretreatment and operation & maintenance can extend the life of the soil media*

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Infiltration System ($2,500 per cleaning; $1,000 per inspection)

The proposed infiltration system shall be inspected semi-annually, and shall follow the suggested schedule for routine maintenance during the regular operation of the stormwater system:

Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

Maintenance and Emergency Repairs

Any maintenance or emergency repairs to the system will be the responsibility of the Owner.

INSPECTION REPORT FORM FOR STORM WATER SYSTEM

Project: Arlington High School, Arlington, MA
869 Massachusetts Avenue, Arlington, MA 02476

INSPECTOR:_____ **DATE:**_____

Regular Inspection: ☐
Inspection after Rainfall: ☐ **Amount of Rainfall:**_____**inches**

BMP	Functioning Correctly	Notes/Action Taken
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	

Additional Observations: _____

_____

_____

Action Required: _____

_____

_____

To be performed by:_____ **On or Before:**_____

APPENDIX 5:
Calculations

STORM DRAIN COMPUTATION SHEET

5/7/2020

Section 1: Direct Inlet "Branch" Segments (Area Drains, Catch Basins, etc.)

SEGMENT			WATERSHED CHARACTERISTICS Design Frequency 25-year					PIPE CHARACTERISTICS				MANNING'S VALUES Pipe Design Depth 1.00 D					
No.	Start	End	Drain. Area	Runoff Coeff.	Time of Conc.	Rainfall Intens.	Q (min) CiA	Pipe Diameter D	Pipe Material	Pipe Length	Pipe Slope	n	A	R	Q (max)	Head above invert	Velocity
			acres		min	in/hr	cfs	in		ft			sf	ft		ft	fps
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
1	CB1	DMH1	0.123	0.95	6.0	5.90	**0.70**	12	HDPE	177	0.015	0.011	0.785	0.250	**5.17**	-	0.0 fps
2	CB2	DMH1	0.117	0.95	6.0	5.90	**0.66**	12	HDPE	6	0.010	0.011	0.785	0.250	**4.22**	-	3.6 fps
3	CB3	DMH12	0.443	0.58	6.0	5.90	**1.54**	12	HDPE	171	0.005	0.011	0.785	0.250	**2.99**	-	4.0 fps
4	CB4	RG2	0.372	0.95	6.0	5.90	**2.31**	12	HDPE	128	0.050	0.011	0.785	0.250	**9.44**	-	9.4 fps
5	CB5	DMH3	0.474	0.90	6.0	5.90	**2.53**	12	HDPE	183	0.050	0.010	0.785	0.250	**10.38**	-	11.5 fps
6	CB6	DMH11	0.305	0.80	6.0	5.90	**1.45**	12	HDPE	52	0.042	0.011	0.785	0.250	**8.65**	-	7.7 fps
7	CB7	DMH11	0.641	0.94	6.0	5.90	**3.57**	12	HDPE	60	0.009	0.011	0.785	0.250	**4.01**	-	5.1 fps
8	CB8	WQU1	0.200	0.95	6.0	5.90	**1.13**	12	HDPE	11	0.020	0.011	0.785	0.250	**5.97**	-	7.6 fps
9	CB9	WQU1	0.157	0.80	6.0	5.90	**0.74**	12	HDPE	76	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
10	CB10	DMH3	0.502	0.86	6.0	5.90	**2.57**	12	HDPE	21	0.030	0.011	0.785	0.250	**7.31**	-	9.3 fps
11	CB11	DMH5	0.727	0.57	6.0	5.90	**2.49**	12	HDPE	47	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
12	CB12	DMH7	1.070	0.70	6.0	5.90	**4.43**	12	HDPE	46	0.020	0.011	0.785	0.250	**5.97**	-	7.6 fps
13	CB13	MILL BRK	0.309	0.84	6.0	5.90	**1.55**	12	HDPE	45	0.030	0.011	0.785	0.250	**7.31**	-	9.3 fps
14	TD-2	DMH2	0.237	0.92	6.0	5.90	**1.29**	12	HDPE	107	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
15	AD-3	DMH1	0.101	0.42	6.0	5.90	**0.25**	8	HDPE	48	0.005	0.011	0.349	0.167	**1.01**	-	2.9 fps
16	AD-5	DMH14	0.034	0.95	6.0	5.90	**0.19**	8	HDPE	20	0.100	0.011	0.349	0.167	**4.53**	-	13.0 fps
17	AD-6	DMH4	0.046	0.52	6.0	5.90	**0.14**	8	HDPE	5	0.010	0.011	0.349	0.167	**1.43**	-	4.1 fps
18	AD-7	DMH5	0.023	0.25	6.0	5.90	**0.03**	8	HDPE	12	0.010	0.011	0.349	0.167	**1.43**	-	4.1 fps
19	RD-1	DMH13	0.656	0.95	6.0	5.90	**3.71**	12	HDPE	150	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
20	RD-2	DMH13	0.576	0.95	6.0	5.90	**3.25**	12	HDPE	14	0.025	0.011	0.785	0.250	**6.68**	-	8.5 fps
21	RD-3	DMH8	0.232	0.95	6.0	5.90	**1.31**	10	HDPE	20	0.030	0.011	0.545	0.208	**4.50**	-	8.2 fps
22	RD-4	DMH6	0.862	0.95	6.0	5.90	**4.87**	12	HDPE	52	0.020	0.011	0.785	0.250	**5.97**	-	7.6 fps
23	RD-5	DMH5	0.709	0.95	6.0	5.90	**4.01**	12	HDPE	49	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
24	RD-6	DMH4	0.333	0.95	6.0	5.90	**1.88**	12	HDPE	8	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
25	RD-7	DMH14	0.186	0.95	6.0	5.90	**1.05**	12	HDPE	7	0.010	0.011	0.785	0.250	**4.22**	-	5.4 fps
26	AD15	DMH3	0.307	0.22	6.0	5.90	**0.40**	6	PVC	106	0.015	0.010	0.196	0.125	**0.90**	-	4.6 fps
27	AD10	DMH8	0.132	0.71	6.0	5.90	**0.56**	6	PVC	200	0.016	0.010	0.196	0.125	**0.93**	-	4.7 fps

STORM DRAIN COMPUTATION SHEET

Section 2: Main Line "Trunk" Segments (Drain Basins, Manholes, etc.)

SEGMENT			WATERSHED CHARACTERISTICS Design Frequency 25-year	PIPE CHARACTERISTICS				MANNING'S VALUES Pipe Design Depth 1.00 D					
No.	Start	End	Q (min)	Pipe Diameter	Pipe Material	Pipe Length	Pipe Slope	n	A	R	Q (max)	Head above invert	Velocity
1	DMH1	DMH2	**1.36**	12	HDPE	46	0.010	0.011	0.785	0.250	**4.22**	-	4.6 fps
2	DMH2	RG1	**2.65**	12	HDPE	99	0.050	0.011	0.785	0.250	**9.44**	-	9.7 fps
3	DMH14	DMH3	**1.24**	12	HDPE	33	0.010	0.011	0.785	0.250	**4.22**	-	4.4 fps
4	DMH3	DMH4	**10.18**	24	HDPE	81	0.005	0.011	3.142	0.500	**18.96**	-	6.2 fps
5	DMH4	DMH5	**12.20**	24	HDPE	90	0.005	0.011	3.142	0.500	**18.96**	-	6.5 fps
6	DMH5	DMH6	**21.10**	30	HDPE	108	0.005	0.011	4.909	0.625	**34.37**	-	7.5 fps
7	DMH6	DMH7	**25.97**	30	HDPE	74	0.005	0.011	4.909	0.625	**34.37**	-	7.0 fps
8	DMH7	DMH8	**30.39**	30	HDPE	115	0.005	0.011	4.909	0.625	**34.37**	-	7.0 fps
9	DMH8	DMH9	**32.27**	30	HDPE	90	0.005	0.011	4.909	0.625	**34.37**	-	7.0 fps
10	DMH11	DMH10	**5.02**	15	HDPE	20	0.005	0.011	1.227	0.313	**5.41**	-	4.4 fps
11	DMH10	UGS1	**6.57**	18	HDPE	4	0.005	0.011	1.767	0.375	**8.80**	-	5.6 fps
12	WQU1	MILL BRK	**1.87**	12	HDPE	11	0.020	0.011	0.785	0.250	**5.97**	-	7.6 fps
13	DMH13	DMH15	**6.96**	12	HDPE	62	0.030	0.011	0.785	0.250	**7.31**	-	9.3 fps
14	DMH15	DMH12	**6.96**	12	HDPE	47	0.240	0.011	0.785	0.250	**20.68**	-	26.3 fps
15	DMH12	DMH16	**6.96**	12	HDPE	82	0.130	0.011	0.785	0.250	**15.22**	-	19.4 fps
16	DMH16	DMH17	**6.96**	15	HDPE	70	0.027	0.011	1.227	0.313	**12.58**	-	10.2 fps
17	DMH17	DMH18	**6.96**	15	HDPE	80	0.025	0.011	1.227	0.313	**12.10**	-	9.9 fps

Stage-Area-Storage for Pond 1P: rain garden#1 cascading

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
58.50	150	0
58.55	150	3
58.60	150	6
58.65	150	9
58.70	150	12
58.75	150	15
58.80	150	18
58.85	150	21
58.90	150	24
58.95	150	27
59.00	150	30
59.05	150	32
59.10	150	34
59.15	150	36
59.20	150	38
59.25	150	39
59.30	150	41
59.35	150	43
59.40	150	45
59.45	150	47
59.50	150	49
59.55	150	51
59.60	150	53
59.65	150	54
59.70	150	56
59.75	150	58
59.80	150	60
59.85	150	62
59.90	150	64
59.95	150	66
60.00	150	68
60.05	150	69
60.10	150	71
60.15	150	73
60.20	150	75
60.25	150	77
60.30	150	79
60.35	150	80
60.40	150	82
60.45	150	83
60.50	150	85
60.55	159	93
60.60	167	101
60.65	176	109
60.70	184	118
60.75	193	128
60.80	202	138
60.85	210	148
60.90	219	159
60.95	227	170
61.00	236	181
61.05	249	194
61.10	263	206
61.15	276	220
61.20	289	234
61.25	303	249
61.30	316	264
61.35	329	280
61.40	343	297
61.45	356	315
61.50	370	333
61.55	383	352
61.60	396	371
61.65	410	391
61.70	423	412
61.75	436	434
61.80	450	456
61.85	463	479
61.90	476	502
61.95	490	526
62.00	503	551
62.05	511	576
62.10	519	602
62.15	527	628
62.20	534	655
62.25	542	682
62.30	550	709
62.35	558	737
62.40	566	765
62.45	574	793
62.50	582	822
62.55	589	851
62.60	597	881
62.65	605	911
62.70	613	942
62.75	621	972
62.80	629	1,004
62.85	636	1,035
62.90	644	1,067
62.95	652	1,100
63.00	**660**	**1,132**

STATIC STORAGE

Stage-Area-Storage for Pond 2P: rain garden#2 cascading

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
51.00	400	0
51.05	400	8
51.10	400	16
51.15	400	24
51.20	400	32
51.25	400	40
51.30	400	48
51.35	400	56
51.40	400	64
51.45	400	72
51.50	400	80
51.55	400	85
51.60	400	90
51.65	400	95
51.70	400	100
51.75	400	105
51.80	400	110
51.85	400	115
51.90	400	120
51.95	400	125
52.00	400	130
52.05	400	135
52.10	400	140
52.15	400	145
52.20	400	150
52.25	400	155
52.30	400	160
52.35	400	165
52.40	400	170
52.45	400	175
52.50	400	180
52.55	400	185
52.60	400	190
52.65	400	195
52.70	400	200
52.75	400	205
52.80	400	210
52.85	400	215
52.90	400	219
52.95	400	223
53.00	400	227
53.05	415	247
53.10	429	268
53.15	444	290
53.20	459	312
53.25	474	336
53.30	488	360
53.35	503	385
53.40	518	410
53.45	532	436
53.50	547	463
53.55	562	491
53.60	576	520
53.65	591	549
53.70	606	579
53.75	621	609
53.80	635	641
53.85	650	673
53.90	665	706
53.95	679	739
54.00	694	774
54.05	726	809
54.10	757	846
54.15	789	885
54.20	820	925
54.25	852	967
54.30	884	1,010
54.35	915	1,055
54.40	947	1,102
54.45	978	1,150
54.50	1,010	1,200
54.55	1,042	1,251
54.60	1,073	1,304
54.65	1,105	1,358
54.70	1,136	1,414
54.75	1,168	1,472
54.80	1,200	1,531
54.85	1,231	1,592
54.90	1,263	1,654
54.95	1,294	1,718
55.00	**1,326**	**1,784**

STATIC STORAGE

Stage-Area-Storage for Pond 3P: rain garden#3 cascading

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
46.00	600	0
46.05	600	12
46.10	600	24
46.15	600	36
46.20	600	48
46.25	600	60
46.30	600	72
46.35	600	84
46.40	600	96
46.45	600	108
46.50	600	120
46.55	600	127
46.60	600	135
46.65	600	142
46.70	600	150
46.75	600	158
46.80	600	165
46.85	600	173
46.90	600	180
46.95	600	188
47.00	600	195
47.05	600	202
47.10	600	210
47.15	600	217
47.20	600	225
47.25	600	233
47.30	600	240
47.35	600	248
47.40	600	255
47.45	600	263
47.50	600	270
47.55	600	277
47.60	600	285
47.65	600	292
47.70	600	300
47.75	600	308
47.80	600	315
47.85	600	322
47.90	600	328
47.95	600	334
48.00	600	340
48.05	618	370
48.10	636	402
48.15	654	434
48.20	671	467
48.25	689	501
48.30	707	536
48.35	725	572
48.40	743	608
48.45	761	646
48.50	779	685
48.55	796	724

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
48.60	814	764
48.65	832	805
48.70	850	847
48.75	868	890
48.80	886	934
48.85	903	979
48.90	921	1,024
48.95	939	1,071
49.00	957	1,118
49.05	978	1,167
49.10	999	1,216
49.15	1,019	1,267
49.20	1,040	1,318
49.25	1,061	1,371
49.30	1,082	1,424
49.35	1,103	1,479
49.40	1,123	1,534
49.45	1,144	1,591
49.50	1,165	1,649
49.55	1,186	1,708
49.60	1,207	1,767
49.65	1,227	1,828
49.70	1,248	1,890
49.75	1,269	1,953
49.80	1,290	2,017
49.85	1,311	2,082
49.90	1,331	2,148
49.95	1,352	2,215
50.00	**1,373**	**2,283**

STATIC STORAGE

Stage-Area-Storage for Pond 4P: UGS-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
39.50	**1,672**	0
39.60	1,672	59
39.70	1,672	117
39.80	1,672	176
39.90	1,672	234
40.00	1,672	293
40.10	1,672	351
40.20	1,672	410
40.30	1,672	508
40.40	1,672	645
40.50	1,672	783
40.60	1,672	919
40.70	1,672	1,055
40.80	1,672	1,190
40.90	1,672	1,325
41.00	1,672	1,459
41.10	1,672	1,592
41.20	1,672	1,724
41.30	1,672	1,855
41.40	1,672	1,986
41.50	1,672	2,116
41.60	1,672	2,244
41.70	1,672	2,372
41.80	1,672	2,498
41.90	1,672	2,623
42.00	1,672	2,747
42.10	1,672	2,870
42.20	1,672	2,991
42.30	1,672	3,110
42.40	1,672	3,228
42.50	1,672	3,344
42.60	1,672	3,458
42.70	1,672	3,570
42.80	1,672	3,680
42.90	1,672	3,788
43.00	1,672	3,893
43.10	1,672	3,995
43.20	1,672	4,094
43.30	1,672	4,190
43.40	1,672	4,282
43.50	1,672	4,369
43.60	1,672	4,449
43.70	1,672	4,522
43.80	1,672	4,588
43.90	1,672	4,652
44.00	1,672	4,712
44.10	1,672	4,771
44.20	1,672	4,829
44.30	1,672	4,888
44.40	1,672	4,946
44.50	1,672	5,005
44.60	1,672	5,063
44.70	1,672	5,122
44.80	1,672	5,180
44.90	1,672	5,239
45.00	1,672	**5,297**

STATIC STORAGE

ARLINGTON HIGH SCHOOL CULVERT RELOCATION

Existing Culvert:

In the existing condition there is a large culvert, consisting of a 36" reinforced concrete pipe (RCP), that flows under the existing building and discharges to the Mill Brook culvert. This culvert carries a large watershed from South of the project site which measures 4,626,374 sf (106.20 Ac). Historically this culvert has been shown to be undersized and has caused flooding and foloor buckling within the basement of the high school and will be relocated and improved under post construction conditions while keeping the flow rates equal to the existing flow rates so that the stormwater doesn't impact areas downstream.

Results/ Summary

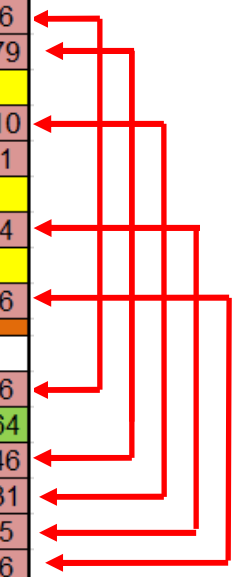
Through the use of the rational method to anticpate pipe discharge rates, both the existing and proposed culvert were modeled to show flows for the 25 year storm event.

The watershed that contributes to the culvert is large and holds approximately 40.36 acres,as shown in the chart entitled WATERSHED DRAINAGE CALCULATIONS below.

WATERSHED DRAINAGE CALCULATIONS												
LOCATION		IMPERVIOUS AREA			OTHER			SUM		I	Q	
FROM	TO	A (Ac)	C	CA	A (Ac)	C	CA	CA	Tc	(in/hr)	IxCA	**DESIGN PERIOD 25-YEAR**
Watershed	Culvert	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	

As shown in Table 1, the post development flows are similar to the pre-development flows so that the new culvert will not have an adverse effect to downstream areas.

Existing Culvert 36" RCP																
Ex. MH	Pipe Bend	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	RCP	0.005	0.013	47.16
Pipe Bend	Ex. MH 1	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	RCP	0.160	0.013	266.79
	Site Area 1	0.47	0.9	0.42	1.07	0.3	0.32	0.74	11.6	6.0						
Ex. MH 1	Ex. MH 2	40.83	0.9	36.75	66.92	0.3	20.08	56.82	11.6	6.0	340.94	36	RCP	0.052	0.013	152.10
Ex. MH 2	Ex. MH 3	40.83	0.9	36.75	66.92	0.3	20.08	56.82	11.6	6.0	340.94	36	RCP	0.013	0.013	77.21
	Site Area 2	0.56	0.9	0.50	0.74	0.3	0.22	0.73	11.6	6.0						
Ex. MH 3	Ex. MH 4	41.39	0.9	37.25	67.66	0.3	20.30	57.55	11.6	6.0	345.29	36	RCP	0.014	0.013	78.64
	Site Area 3	0.67	0.9	0.60	0.18	0.3	0.05	0.66	11.6	6.0						
Ex. MH 4	Ex. culvert	42.06	0.9	37.85	67.84	0.3	20.35	58.21	11.6	6.0	349.24	36	RCP	0.005	0.013	47.16
Proposed Culvert - 48" / 36" CLDI Blended Option																
Ex. MH	DS-1	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	RCP	0.005	0.013	47.16
DS-1	ACC PT 1	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	48	DI	0.033	0.010	336.64
ACC PT 1	ACC PT 2	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	DI	0.075	0.010	237.46
ACC PT 2	ACC PT 3	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	DI	0.033	0.010	156.31
ACC PT 3	DS-2	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	DI	0.008	0.010	77.55
DS-2	Ex. culvert	40.36	0.9	36.32	65.85	0.3	19.76	56.08	11.6	6.0	336.47	36	RCP	0.005	0.013	47.16



APPENDIX 6:
Sketches

SHEET FLOW
SLOPE = 1.0%
L=50'

12" PIPE FLOW
SLOPE = 1.0%
L=20'

TIME OF
CONCENTRATION
(TYP.)

CULVERT FLOW
SLOPE = 0.5%
L=500'

SHALLOW
CONCENTRATED FLOW
SLOPE = 1.4%
L=220'

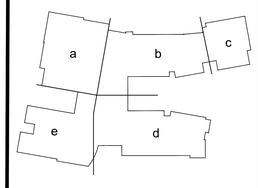
SHALLOW CONCENTRATED
FLOW (PAVED)
SLOPE = 1.5%
L=140'

POA-1

WS-EX-1

40 20 0 40 80
1 inch = 40feet

KEYPLAN



REVISIONS NO.	DATE	REMARKS	BY

DRAWING NUMBER
EX-HYD

JOB NUMBER 17211

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60% CONSTRUCTION DOCUMENTS
PROGRESS SET 05-04-2020

Arlington High School
Massachusetts Avenue, Arlington, Massachusetts
EXISTING CONDITIONS
HYDROLOGY MAP
SCALE: 1"=40'
DRAWN BY: SM
CHECKED BY: SG

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Arlington High School
Massachusetts Avenue, Arlington, Massachusetts
PROPOSED CONDITIONS HYDROLOGY MAP
SCALE: DRAWN BY: SM CHECKED BY: SG

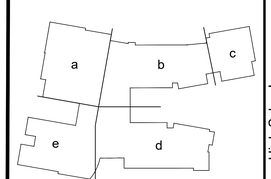
REVISIONS NO	DATE	REMARKS	BY

DRAWING NUMBER
P-HYD
JOB NUMBER 17211

AD-8
AD-11
AD-12
AD-13
AD-14
AD-15
AD-9
AD-10
CB-5
CB-4
CB-10
CB-11
CB-12
CB-13
DMH-5
DMH-6
DMH-7
DMH-8
DMH-19
RG-3
RG-2
DMH-3
DMH-4
DMH-9
DMH-14
RD-7
AD-5
RD-6
AD-6
AD-7
RD-5
SP-2
AD-4
SP-1
FES-1
RD-4
RD-3
DMH-18
UGS-1
TD-1
OCS-1
FES-3
DMH-21
CB-7
WQU-1
DMH-11
CB-8
FES-2
RG-1
DMH-2
TD-2
CB-3
DMH-10
CB-6
CB-9
DMH-13
DMH-16
DMH-20
DMH-1
AD-3
CB-2
RD-1
RD-2
DMH-15
DMH-12
RELOCATED CULVERT PIPE
CB-1
AD-2
AD-1
Summer Street
Mill Brook
Brook (Public – Variable Width)
Drive
Schouler Court (Public – Width Varies)
Massachusetts Avenue (Public – Variable Width)

40 20 0 40 80
1 inch = 40feet

KEYPLAN



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Arlington High School
Massachusetts Avenue, Arlington, Massachusetts
BMP LOCATION MAP

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REVISIONS NO.	DATE	REMARKS	BY

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